# GAS JOURNAL

## LIGHT HEAT POWER BYE-PRODUCTS

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# 1927

## A Year of Constructive Work.

UPON the year which is about to close we can to-day look with feelings of gratification. It opened with all the difficulties, worries, vexations, and money and trade waste which the great labour upheaval and the coal stoppage of 1926 had imposed on the country; but there was a general desire to bring about a rehabilitation of our industrial and commercial interests as quickly as possible, though a heavy drag upon this was (it still has its retarding effects upon trade, and will long do so) the burden of taxes through the war, and the weight of rates (made the heavier by unemployment) which local spending has brought about. But within the limits of power, gigantic things were achieved; and now at the end of the year, glancing back upon it, one cannot fail to be struck by the fact that it has been a period of transition with excellent constructive tendencies. Constructive tendencies may not, however, always be good; but in the main, so far as the internal affairs of the gas industry are concerned, we think it may be said with assurance that we are moving on the right lines, although perhaps not so fast as some among us would desire. We saw the rapid progress which the coal industry was able to make by the aid of low prices in the restoration of the export coal markets, though trade depression at home prevented it getting firmly on its feet again. But coal prices fell considerably; and this was a good thing for the gas industry, especially at a period when it was busy wiping off the accumulation of expenditure which it had to incur in buying foreign coal for the maintenance of the supply of gas to the country during the long coal stoppage. On top of this, however, we are faced with the introduction of coal-selling organizations; and the degree to which these will grow is yet an unknown quantity, as are also their effects upon the gas industry's interests. But unified selling in the coal-fields (it is hoped, though the hope is only faintly expressed, to reduce costs of production), we fear, means restriction of output and higher prices, as in certain coal areas correlation of output and demand is deemed imperative.

More has been done in making the gas industry seen and heard during the year and in obtaining for it greater commendation. The need for this is forced home by the developments with which it has to contend—such as those in the coal industry and the electrical industry, and competition with its secondary products. It is taking a good part in the developments of the times—such as in the work of the National Fuel and Power Committee and in that of the Institute of Fuel, which hopes to bring about greater economy and efficiency through research and co-ordination in the use of fuel. There has been growth in the use of coke-oven gas; and there is expansion of the aspirations of the coke-oven industries in this direction. Simultaneously, the owners of such plants, in the hope of bettering their economic conditions, are equipping themselves for making greater inroads into the domestic coke market. However, the greatest piece of constructive work is the maturing of the legislative plans for the gas industry. Technically, of the highest importance is the research work and the development of practice in respect of the physical conditions of coal charges in carbonization, which are resulting in new efficiencies and promise of further success; and another advance, which it is believed will have far-reaching effects, is the introduction into practice of a method for reducing the moisture content of gas. Regarding gas trading, prices to consumers have been restored to pre-coal stoppage levels; and in some cases where conditions favour they have been reduced below them. The policy of enlarged service among the consumers has also extended. The Road Tar Association has been established, and is actively at work. The Institution Education Scheme has been improved to meet difficulties which experience has disclosed. But above all in this constructive year has been the distinct change in the outlook of many of our responsible labour leaders; and in this respect matters never looked more hopeful than at present of realizing those conditions which will establish peace in the industries of our country. Truly, the year 1926 produced valuable lessons, as well as grim anxiety and terrible waste. It also proved that the country possesses wonderful vitality and recuperative power.

### THE GAS INDUSTRY AND THE COAL STRIKE.

The great coal strike, it has been computed, cost the country 300 millions sterling. During its run the Miners' Federation collected and spent over two millions of money, depleted their own and their associated unions' coffers, ran them into debt, and squandered the savings of miners, and also led them into debt. Sir David Milne-Watson, in his address at the annual meeting of the National Gas Council, mentioned that it had been estimated that the coal strike increased the coal bill of the gas industry by 15 millions sterling, but, on the average, the price of gas was only temporarily increased by about 25 p.ct. The Board of Trade Returns for 1926 showed that, though the sale of gas was more by 10,811·29 million c.ft., the quantity of coal carbonized was less by 467,000 tons; the total being 16,564,172 tons, as compared with 17,031,172 tons in 1925. On the other hand, in using 1,435,572 tons of coke 282,159 tons more were gasified in the making of water gas, and the purveyors of gas oil were able to dispose of 36,320,745 gallons more to the statutory gas undertakings—the actual requirement in the year being 97,703,394 gallons, as against 61,382,649 gallons in 1925.

### THE HELP OF FOREIGN COAL.

It was foreign coal, however, that helped the country and the gas industry to win through. The Board of Trade returns for January brought the information that, during the coal stoppage period and up to the end of December, a total of 20,033,370 tons of coal had been imported. This was valued at £43,020,554. In addition, 1,071,406 tons of coke and briquettes were imported during the eight months, of the value of £2,517,712. The average prices of the coal imported ranged from about 35s. 9d. per ton in July to 52s. 2½d. in December. But there were contracts which had been made forward for foreign coal purely for safety purposes, and in January no less than 1,872,437 tons were received, of a value of £5,215,223, which works out to an average value of £2 14s. per ton, while our own exports of coal that month were only realizing an average of a little more than £1 per ton. That average, however, was not the peak price that had to be paid for some deliveries of coal from abroad. In

smaller quantities, imports continued for the next three or four months, until contract engagements were exhausted.

### MINERS AND EMPLOYMENT.

This continued importation of foreign coal naturally had an effect upon the demand for the home product; and with industries unable to re-assert themselves at normal level owing to the stoppage, loss of markets, &c., the collieries found it impossible to regain quickly even the position of demand which existed in the early part of 1926. This caused a relaxation of the views which previously existed that there would be an immediate heavy request for coal for home use, and that prices would be at a better level than that at which it was possible to maintain them. Upon this came the embargo (lately removed) upon imported coal by France, supplementing that existing in Spain. Moreover, other countries had entered into occupation of markets which we formerly possessed, and oil fuel had taken a larger place in industrial service. The Miners' Federation privately viewed with some dismay the wreckage caused by their policy. But publicly they were soon making a fuss, particularly the extremist element, regarding the amount of unemployment among the miners; and charges were freely made as to victimization by the managements of collieries. The Federation completely overlooked the fact that their insane policy since the war had been the main cause of the conditions that existed. It was quickly found, through the higher output per worker, with its consequent effect upon production costs, that the industry, prior to the coal stoppage, had been much over-manned; and to this was due a large proportion of the unemployment which existed. The grumbling as to unemployment continued through the year; but from a private report of the Miners' Federation, which they did not intend should see the light of day, it was learned that the Executive fully realized that the industry had been over-manned, and that those who had entered it during the war had no right there to the exclusion of the old miners. But though a great deal of sympathy for the miners was evoked, a report emanating from South Wales showed that men who were out of employment were very reluctant to take work in any other industry, but preferred idling about, supported by the dole, in the hope that they would be re-absorbed in the mines. That speaks well for the miners' own opinion of mining.

### REVISION OF THE FIRST WAGES AGREEMENT.

The first of the wages agreements entered into at the end of the coal stoppage was due to expire towards the end of the year. This referred to Durham; and it illustrates the great advantage of having district agreements for the coal industry in lieu of the old national agreements. The Miners' Federation endeavoured to have a finger in the re-arranging of this particular agreement; but, without their assistance, conferences between the Durham Miners' Association and the colliery owners brought about a satisfactory pact. In the first instance, the owners had asked for a reduction of the then existing subsistence wage and of the minimum percentage which is added to the basic rate. But they also suggested that they were prepared, if the Miners' Association would agree, to accept the inclusion in the county agreement of a clause similar to that in the Northumberland agreement. This gives either side the opportunity, after a month's notice, to bring the question of the minimum percentage before the Independent Chairman. The Miners' Association recommended the lodges to accept this proposal, and by an almost unanimous vote they did so. This decision meant that there would be no stoppage of work, that the then present wages would continue to the end of February, and, failing a mutual arrangement, the Independent Chairman would decide the minimum percentage for March. It was a relief to gas undertakings who draw their coal supplies from Durham to learn that this agreement had been effected.

### COAL OUTPUTS.

Generally speaking, the miners worked excellently during the year. Even towards the end of December of last year, the production had, considering the circumstances, reached good weekly figures—such as 4,878,900 tons in the week ended Dec. 18, with the number of workers at 925,400; and in the week ended Dec. 25 4,651,500 tons, with 945,400 workers. A good start was made in January; and in the week ended Jan. 8, 5,025,300 tons were raised, with 966,700 wage earners employed. The outputs continued at above the 5 million level with one or two exceptions (chiefly holiday weeks) throughout the first half of the year. The best figure reached was in the week ended Feb. 26, with 5,371,400 tons and 1,012,700 workers. Unfortunately, with the reduced demand owing to summer time, accumulated stocks, and continued industrial depression, it was necessary further to reduce production. Thus onwards the output was under the 5 million mark, and the number of workers receded to figures round about 982,000—sometimes above, sometimes below. Up to the end of October from the beginning of July, the best week's output was in that ended Oct. 22, when 4,990,000 tons were raised; the number of employees being 983,100. In the week ended Dec. 3, the production was 5,027,700 tons, with 976,100 workers.

### COAL EXPORTS.

Of interest will be a few figures regarding the deplorable loss of coal trade abroad through the stoppage in 1926. The overseas business continued that year up to the end of April. The total exports for the year amounted to 20·59 million tons, compared with 50·8 millions in 1925—a reduction of no less than 30·2 millions, or upwards of 59 p.ct. In 1924, the total exports were 61·6 millions. To the end of November this year, the quantity sent abroad was 47,262,788 tons, of a value of £42,405,921. In the year preceding the war (1913), the exports amounted to 73 million tons.

### CONSTANTLY DECLINING CONDITIONS.

The conditions of the coal industry continued throughout the year seriously to decline; and thus the expectations formed at its opening were falsified in a manner which gave the gravest concern to all engaged in coal getting and trading. Not only was it necessary, as already seen, to reduce the number of men employed in order to restrict the output, and prevent further accumulation of stocks at the pithead, but many pits had to be closed during the year. In the House of Commons, towards the end of November, Col. Lane Fox, Secretary for Mines, gave the information that during the twelve months 290 pits, employing 43,000 wage earners, had been closed for economic reasons. Although, too, the export trade was fairly quickly re-established in quantity (though not completely in respect of geographical position of markets), this was only done by lowering prices to levels which would compete with the coal produced in other countries. Whereas in January the average price realized for exported coal was £1 0s. 11d., this gradually receded until in November the average value of gas coal was 15s. 4·2d. per ton. This tells a tale. Moreover, the collieries found it difficult to enter into new home contracts at the normal periods of the year, owing to the fact that many large and regular buyers—such as gas undertakings—were receiving coal far into the year under contracts which had been interrupted owing to the stoppage. Added to this was the at the time unknown quantity of coal which had been contracted for abroad, but had not then been delivered; and therefore the covering of forward requirements were not hurried.

There is little use mentioning the market quotations which have ruled during the year for home supplies, in view of the fact that most of them were purely nominal, and were not adhered to in order to secure business in the circumstances. Our market reporters have quoted prices from week to week, and their reports are open to consultation so far as any value can be placed upon the figures. But, generally speaking, the trend was downward, and comparing the quoted prices as between January and the end of the year, it may be said that they close from 5s. to 7s. lower per ton, according to quality—the highest qualities have suffered the largest reduction.

### COAL-SELLING ORGANIZATIONS.

This brings us to a fresh position in connection with coal dealings. For some time, as is well known, Sir Alfred Mond has been a protagonist of coal-selling agencies in this country, after the style of the German Coal-Selling Syndicate, which he and others have acclaimed

as being a model of what is correct for the restoration of the economic conditions of the coal industry in this country. But, as is well known by readers of the "JOURNAL," the methods of the German Coal-Selling Syndicate have not, from the point of view of gas undertakings, been altogether of a desirable and commendable character. From reports to hand, it would seem that they are somewhat autocratic over the qualities of coal they supply to their customers. While the gas undertakings know what they require, the Coal Syndicate blend coals and supply what they themselves think proper. We want nothing of that sort here. The interesting news came from Germany that certain gas undertakings have purchased big coal concessions in the Westphalian coal field, with mining works, and two coke-oven plants, with an annual output of 1765 million c.ft. of gas.

Early in the year, certain groups of collieries in Yorkshire combined for the purpose of trading in their produce, hoping that by such combination they would be able to secure prices which would place the collieries in a more advantageous position financially. In the result, it was proved that, without universality in price fixing, supported by regional limitation of output in relation to demand, nothing can prevent prices following the general trend. Towards the end of the year, the coal owners in South Wales and Monmouthshire formed what is known as the South Wales Coal-Marketing Board; but in their case, while the regulation of prices is the main feature of the scheme, regulation of output is not contemplated. On the other hand, a pool is being formed by the payment of 3d. a ton on output, which is to be available for compensating collieries that lose shifts through want of trade, caused by their not accepting prices below their economic values. Following this, the coal owners of Yorkshire, Nottinghamshire, and Derbyshire have been deliberating over the question of forming a Coal-Selling Organization for the three counties; but in their case restriction of output is contemplated. No secret is made of the fact that one object of these selling organizations is to get higher prices from such public utility undertakings as railways, gas and electricity suppliers, and other large industrial enterprises. It is said that while for household coal prices are paid which are economic ones, the large undertakings do not pay prices which are commensurate with economic value. It must not be overlooked that gas undertakings are all-the-year-round buyers, and their custom is therefore of the greatest value to the collieries, in that they assist in maintaining work at the collieries at periods of the year when the lowest general demand exists.

### FOREIGN COAL EXPERIENCES.

Early in the year there were several references in our columns to the experiences there had been with the carbonization of foreign coals. Prominent among these was the article, in our issue for Jan. 26, by (the late) Dr. Geoffrey Weyman, in which he related the findings of the Newcastle and Gateshead Gas Company with foreign coals and unusual home ones. The information he gave fairly illustrated the experiences of gas undertakings throughout the country. Among the features of his contribution was a reference to the depreciation that took place in the quality of coal which had been stocked a long time, and which showed a loss of therms, with the hardness of the coke substantially reduced. Reasons were given for this. He also illustrated how much of the coal which was supplied to us from Continental sources during the stoppage was inferior in gas and coke making properties—one result being that the poor coke caused trouble in the producers. Commented upon, too, was the confusion caused in the process of carbonization by deliveries being mixed in most disorderly fashion—coking and non-coking coal and coking duff succeeding one another, and having to be utilized without any opportunity for blending in proper proportions with the view of improving the value of the coke. American coals gave immense relief; and this reflects the experiences of gas undertakings throughout the country. At Newcastle, some half-a-dozen types of American coals were carbonized; and they more closely resembled South Yorkshire coals than the more strongly coking Durham coals. Comment on experiences with coal from abroad was also made in Mr. James Bell's Presidential Address to the North British Association; and incidental references to the subject were made in several other contributions to our columns.

### SCIENTIFIC WORK ON COAL.

One of the noticeable features of the year has been the extensive exploration that is in hand in relation to our coal supplies and their utilization. The reports of the Fuel Research Board regarding the work which is being done at the Station, under the direction of Dr. C. H. Lander, showed that it is of spacious order. The machinery for making surveys of the coal areas has been enlarged; and the results will be of considerable value to all who are in any way concerned in the purchase and utilization of coal. We cannot catalogue the whole of the work that is being carried out. Many of the published papers have treated of grading, sampling, and analyzing—particularly those submitted at the Coal-Cleaning Conference which was held in Edinburgh in connection with the annual meeting of the Society of Chemical Industry. A conference held at the Institution of Civil Engineers unanimously decided that the British Engineering Standards Association should set-up a representative Committee to consider the question of standardizing the sampling and analysis of coal. At the British Association meeting there was a long discussion on coal, in which Dr. Lander and Prof. J. W. Cobb took prominent part, while Prof. R. V. Wheeler dilated upon its chemistry. In his address as President of the Institute of Fuel, Sir Alfred Mond foreshadowed the coming of a new process for the removal of ash from coal which offers "very considerable possibilities." He anticipates that it will reduce the ash content below 2 p.ct., which is a prospect the gas industry regards with sympathetic interest.

### GAS OIL.

It will be remembered that during the coal stoppage the deliveries of gas oil to this country increased enormously, with the result that during the twelve months ended December, 1926, the total received was 117,042,798 gallons, as compared with 72,652,528 gallons in 1925. The incoming oil was maintained in volume during the early months of the year; but subsequently there was a decline, with the result that, by the end of November, the total quantity of gas oil imported had reached for the eleven months 92,102,647 gallons. In our "Correspondence" columns Mr. Frank Livesey, Mr. J. F. Tyndall, and Mr. A. M. Paddon complained of the continued high price of gas oil. A small reduction was made from April 11—in 10-ton lots to 5½d., and in smaller quantities, of 1000 gallons and upwards, to 5¾d., net and naked *ex*-wharf. Later in the year the prices were reduced respectively to 4¾d. and 5d.

### FUEL ORGANIZATION.

It will be remembered that in 1926 the Government appointed a National Fuel and Power Committee, of which Sir Alfred Mond is the Chairman. The fact that this appointment was made testifies to the recognition by the Government of the importance of the fuel problems of the country. The Committee have held several meetings during the year, and have heard evidence from the gas industry in pursuance of a reference to them by the Board of Trade in relation to the new legislation for the industry. The influence which this Committee is likely to have upon our fuel and power problems promises to be of a very powerful order.

Allusion is being made in various parts of the "Retrospect" to topics which came before the Institute of Fuel at their first annual meeting. The Institute, it should be recorded, is an amalgamation of the Institution of Fuel Technology and the Institution of Fuel Economy Engineers. The Fuel Section of the Society of Chemical Industry has also been very active during the year. Prominence has been given by Prof. Cobb to the large scope which fuel presents for professional careers for young men scientifically trained in matters affecting its utilization.

### COKE.

A vast amount of valuable work has been done, and is still being pursued, in connection with our principal secondary product—coke. Additional contribution has been made to the subject of the structure of coke; and certain

factors bearing upon its utilization, such as reactivity, have been discussed. The investigations at the Leeds University in this regard have provided considerable interest. Birmingham investigators have described work directed to devising a standard test for coke; the possibilities of the brazier and weighing method being under consideration. A highly instructive contribution by Mr. Harald Nielsen was made to our columns on "Fuel Relativities." Taking pure carbon as a standard of comparison, he showed that the closer fuel approaches pure carbon in composition—the lower its volatile content—the greater its efficiency. Hence, low volatile coke, like gas coke or metallurgical coke, seems as near the ideal as possible. Having arrived at that stage, we are at once brought up against practical difficulties in regard to the combustion of high-temperature coke, which is covered with a graphitic carbon film, which is neither reactive nor easily combustible, unless the coke is finely pulverized or forced draught is employed as well as high temperatures. Used in the pulverized form, the theoretical flame temperature is higher, the flame radiation higher, and the mean specific heat of the combustion products low. Hence more heat energy per unit of volume in powdered form can be carried than, for example, is the case with any raw coal except anthracite.

Two or three contributions have dealt with the dry quenching of coke. Special mention may be made of the paper by Mr. John P. Leather at the meeting of the Institution of Gas Engineers.

Regarding the utilization of coke, the work of the London Coke Committee, and of their fuel expert (Mr. E. W. L. Nicol), continued unremittingly during the year. In a paper contributed to the London and Southern Junior Association towards the end of February, Mr. Nicol pointed to the big and growing demand for coke in several directions in which at one time a market for it did not exist. The change is due to the virtues of the material. It is true it has taken a long time to discover those virtues; but it has been rather a matter of incorrect application than any inherent demerit, for if the carbon content is high, the ash and moisture low, and the material is of the right size for the purpose, it must be, properly used, a good fuel. Dr. E. W. Smith, in a particularly arresting paper, dealt with the subject of the utilization of gas coke before the Royal Society of Arts.

On the subject of utilization, it is perfectly obvious that the gas industry is going to meet with much greater competition in the domestic coke market. For example, provision is increasing for the production of graded household coke at colliery coke-oven plants, and low-temperature coke is already being advertised, though no considerable quantity is available. But, in view of the fact that some 40 million tons of raw coal are still being used for domestic purposes in this country, it is obvious that there is a considerable field for all-comers if only householders can be educated to the utilization of such solid fuel. One direction in which very considerable developments have been made in the utilization of coke is the domestic coke-boiler. But the coke-oven people point out that the coke which they supply is particularly valuable for this purpose, though not perhaps for the open grate. It is evident that, to meet the competition for the demand that is going, the quality and grading of gas coke must be the best possible.

In connection with coke trading, it is of interest to notice that the London County Council, in legislation to be promoted next year, are providing (1) that in the County of London coke shall be sold by weight only; (2) that its sale shall be regulated in similar manner to that of coal; and (3) that it shall be an offence to water coke with the view fraudulently to increase its weight.

Another point of interest is that the sales of coke to countries abroad this year have increased. Up to the end of November, the quantity shipped was 883,322 tons, which compares with (for the full year) 387,664 tons in 1926, 889,281 tons in 1925, and 964,539 tons in 1924. The average value of the coke exported this year was £1 0s. 11·8d. per ton.

## TAR.

During the year much work has been done to maintain the prestige of tar for road making and surfacing. The bitumen people have worked cleverly. They carried the tale of the value of their commodity for road-making purposes into high places, into the political world, into Government Departments, into the motoring world, and into the sphere of professional road making, until many people were imbued with the belief that it was economical to use even the imported substance, that it prevented the pollution of rivers, and that road surfaces never had the equal that the exotic material imparted to them. Effective controverting work was carried on by the Road Tar Committee, which organization has developed into the Road Tar Association, in which all tar interests are unified. At a luncheon towards the end of July—at which Sir David Milne-Watson presided—a misunderstanding was corrected which had arisen from a statement made by the Earl of Balfour in the House of Lords, but upon which he put a new construction on Sir David calling his attention to the matter. His Lordship said: "It is possible to interpret what I said as meaning that all roads on which tar derived from coal is used pollute our rivers. That is not, of course, what I intended to say. It is only the roads which border on rivers—a very small minority of all the roads of the country—which have injurious effect upon fish life. Elsewhere, the use of tar is, as might be expected, quite innocuous." Incidentally it may be mentioned that the Managing Committee of the new Association have appointed as President Sir David Milne-Watson, Vice-President Mr. H. C. Head, Chairman of the Managing Council Mr. W. J. U. Woolcock, and Vice-Chairman Dr. J. A. Roelofsen.

Information has been published during the year which shows that the use of bitumen on roads has brought about increased danger owing to the slipperiness of the surface. In "The Motor," a very strong appeal was made for an inquiry into this question. In order to meet the requirements of road authorities, several gas undertakings have engaged in the blending of tar with bitumen for road purposes. But Messrs. William Briggs & Sons, Ltd., succeeded in obtaining the elimination of clauses dealing with this matter in a Provisional Order promoted by the Dundee Corporation; the ground of objection being that engaging in the blending of tar with bitumen was going beyond the powers Parliament had hitherto granted to gas undertakings. Although the clauses were struck out, it was intimated that, if the Corporation wished to apply for powers, they could do so by Private Bill. The objections of the coal-carbonizing industries to the importation of bitumen for road purposes, while a better substance is available from coal carbonization, has received companion protest from the National Joint Industrial Council for the Quarrying Industry. They have strongly complained of the large quantities of foreign stone which have been imported the last few years for road making.

There has been considerable contribution during the year to the subject of tar distillation; but it is impossible to review it here. The question of a new draft specification for road tar is still under consideration.

The total exports of tar, oil, creosote, &c., for the eleven months to the end of November was 35,940,667 tons, compared with 34,627,003 tons in 1926.

## SULPHATE OF AMMONIA.

Regarding sulphate of ammonia, the position remains very unsatisfactory from the commercial point of view; and the low values realizable naturally affect production by the smaller gas undertakings. The low price continued notwithstanding the coal stoppage, which restricted production. Coke-oven plants during that period ceased working altogether; and the abnormal conditions under which gas-works were operating for the greater part of 1926 also had a marked effect on output. Another cause for diminution is the relatively high cost of manufacture. In 1926, the ammonia products manufactured in England and Wales expressed as sulphate, 25¾ p.ct. ammonia, only totalled 264,692 tons. In 1925, the production was 350,612 tons, or 85,920 tons more than the production for 1926. In Scotland, the production in 1926 was 58,800 tons, compared with 78,905 tons in 1925.

Of course, it is the synthetic ammonia process which has produced such large change in the economic and trading position of sulphate of ammonia. In the last annual report of the British Sulphate of Ammonia Federation, it was shown that in the last four years the total production of nitrogen had increased from 1,057,500 metric tons to 1,237,500 tons—an increase of 180,000 tons. However, the consumption in the four years grew from 1,059,000 tons to 1,312,700 tons—an increase of 253,700 tons. The

consumption figure for 1926-27 (1,312,700 tons) is greater than the production figure of 1,237,500 tons by 75,200 tons. There is no doubt the close relation between total consumption and production is due not only to the greater organization which exists in the field, and which has intensified propaganda, but to the lower prices which have stimulated absorption power. From the data given by the Association, it is noticed that while bye-product sulphate of ammonia has advanced in production from 264,600 metric tons to 303,200 tons, the synthetic product has moved from 231,100 tons to 300,000 tons. The future of prices is very doubtful, having regard to the building programme for additional synthetic plant. It should, however, be a warning to those who are now embarking on the manufacture of synthetic nitrogen that their entrance into (at the present time) an overburdened field will, in all probability, contribute to still lower prices. In four years, prices have fallen from £13 6s. to £9 16s. per ton. Synthetic Ammonia Nitrates, Ltd., it is stated, will by 1928 at their Billingham Works have the second largest plant in the world, with an output of 315,000 tons of sulphate of ammonia. In addition to this about 200,000 tons of other products are made for use in dyeing, refrigerating, baking powder, and other industries. A message from New York, which was published in the "Daily Telegraph" on the 9th inst., states that the American Commercial Attaché in Paris reports that "Great Britain, France, and Germany propose to enter into an agreement for the division of the world's markets for dyes and other chemicals." It is asserted that the French and German chemical interests have already reached an agreement; and the British Dyestuffs interests will join as soon as the Government signify their approval. The point of the reference here is that the New York message proceeds to state that favourable progress has been made in the formation of a synthetic nitrogen entente between the three countries.

At the annual meeting of the South Metropolitan Gas Company, Dr. Charles Carpenter, referring to the low value to which sulphate of ammonia has fallen, observed that it is pretty certain that at the Company's Works, handling over 1½ million tons of coal per annum, considerable readjustments of their methods will have ere long to be undertaken. This is a matter which is the subject of consideration and experiment to-day.

Early in June Nitram, Ltd., informed us that they had decided to continue selling sulphate of ammonia for home agricultural use until further notice at the then current prices of £12 6s. per ton for neutral quality, and £11 16s. per ton for ordinary quality, delivered carriage paid in 4-ton lots and upwards to buyer's nearest station, or *ex* works in 1-ton lots and upwards. In August, they announced that they offered sulphate of ammonia for home agricultural use at the following prices for delivery in:

| 1927. | £ | s. | d. | 1928. | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| August | 9 | 18 | 0 | January | 10 | 11 | 0 |
| September | 10 | 0 | 0 | February | 10 | 13 | 0 |
| October | 10 | 2 | 0 | March | 10 | 13 | 0 |
| November | 10 | 5 | 0 | April | 10 | 13 | 0 |
| December | 10 | 8 | 0 | May | 10 | 13 | 0 |

The shipments of sulphate of ammonia up to the end of November amounted to 239,112 tons, compared with 156,762 tons in the corresponding period of 1926—the coal strike year.

### Liquor Effluents.

Notwithstanding the commercial position of sulphate of ammonia, much useful investigation continues to be made into various aspects of production. In his annual report, Dr. T. Lewis Bailey, Chief Inspector for England under the Alkali Works Regulation Act, gave makers of bye-product sulphate of ammonia a good character respecting their working. He and his staff, it was also seen, are still much concerned regarding the question of sulphate of ammonia effluents, which, largely through Dr. Bailey's efforts, has been brought to a stage at which the gas industry considers that investigation and experiment should be carried out. The Council of the Institution of Gas Engineers have appointed a Committee specially to make research into the matter, through the Coal Gas and Fuel Department at the Leeds University. The first report of this Committee was submitted. It is a valuable document. It shows that the problems involved are many, and their solution will require much work on the part of the Committee and their Research Chemist, Dr. A. C. Monkhouse. Accompanying the report is an enlightening memorandum by Dr. Parker.

A process for the removal and recovery of tar acids from ammonia still effluent was referred to by Mr. D. W. Parkes, B.A., B.Sc., in a paper published in our issue for April 6. Subsequently, Messrs. Robinson Bros., Ltd., of West Bromwich, contributed an article in which the results of further work with the process was made available to our readers. A new carbon, manufactured by a British firm, has been used in the process. This is found to be much more active with regard to phenols than any other which has been examined by Messrs. Robinson. The process as developed was briefly explained, and summarized results were given of six continuous runs carried out on liquor from different types of carbonization plant. In every case, the phenols were removed to the extent of 99 p.ct. In some cases, the removal was effected to only 0·1 p.ct. short of 100 p.ct.

The question of the pollution of rivers by effluents from industrial works was under discussion in the House of Lords in July; and it was then intimated by the Earl of Balfour that two new Committees were to be appointed to deal with the question. One of these Committees has already come into existence.

### Gas-Making Problems.

The year has seen the completion of a considerable number of extensions and new carbonizing plant on gas-works, and descriptions have been frequent in the columns of the "Journal." Continuous vertical retort installations have been in the ascendant, and vertical chambers have also invited attention. Developments of horizontal working have been made, and have maintained the favour of many gas engineers, as was illustrated by an article on the "Modernity of Horizontal Retorting" by Mr. H. J. Toogood. There has also been information as to many other large carbonizing plant installations, which will be finished during the coming year. The same applies to water-gas plants, which rendered such invaluable service during the strike period of 1926. This is demonstrated by the fact that the Gas Light and Coke Company in 1926 used in the manufacture of water gas no less than 31,019,589 gallons of oil, and 382,421 tons of coke and breeze—an increase on the previous year of 9,866,966 gallons and 56,306 tons of coke. In a paper which Mr. C. A. Cunnold read before the Southern Association, he gave some highly instructive information regarding the improvement which has been effected in the huge plants of the Company, and which has greatly increased their productive capacity and efficiency, quite apart from the additional efficiency realized by the incorporation of waste-heat boilers. Another outstanding feature of the year was the descriptive account we were enabled to publish of the water-gas plant in being and under construction at the Billingham Works of Synthetic Ammonia, Limited. When the sets are completed, they will be capable of yielding no less than 30 million c.ft. or thereabouts per day; and this will be the second largest installation in any works in the country—the premier one being that at Beckton, where nine sets of plant are capable of producing 45 million c.ft. a day.

To revert to carbonization, the year has witnessed further expansion of work associated with the problem of the charge itself. Design of settings, refractory materials, and temperatures have for many years received a large amount of investigation and experiment; but over the long history of carbonization, it has been left to the present generation of gas men scientifically to explore the contributory part of the physical conditions of the charge in efficiency and results. The Fuel Research Board, the Gas Investigation Committee of the Institution and the Leeds University, and individual engineers have given much consideration to the question of the effect of the separation of dust and fines from large coal in assisting in the penetration of heat through the charges in vertical retorts and accelerating carbonization. In 1926, Mr. T. F. E. Rhead, of Birmingham, contributed, at the meeting of the Institution, an illuminating paper in which the subject was treated. Last June, Mr. T. Carmichael, of Portsmouth, who is an old investigator and practitioner in this particular, gave a paper which supplied from everyday working further testi-

mony to the value of separating the fines and dust from the coal for continuous verticals, and transferring them to horizontal retorts for carbonization. By doing this, he found that, in the continuous verticals, the thermal yield per ton was increased by 10 p.ct., and the output of the plant by no less than 20 p.ct. Moreover, there is less sticking of the charge. The fines resulting from the screening were carbonized in the horizontal plant; and while the make per ton fell slightly—by 1·4 therms—the throughput remained practically the same. In this connection, more has been heard of intermittent vertical chamber systems. There are more aspirants. One form of plant was the subject of a paper before the Institute of Fuel. Another has representation at Ramsgate; and similar plant is going up in Glasgow at present in conjunction with an installation of continuous vertical retorts. In the scheme of operation, the fines are segregated from the larger coal; the former being carbonized in the vertical chambers, the latter in the continuous vertical retorts. The coals used are, comparatively speaking, of poor coking quality; and this procedure will ensure better coke containing less breeze from the verticals, and stronger coke from the fines used in the intermittent vertical chambers.

Further information regarding the influence of size of coal upon gas yields was given in the Eighteenth Report of the Gas Investigation Committee, which also included results of further investigation into the question of mixing coal with calcium carbonate, iron oxide, or sodium carbonate (98 parts of coal, with 2 parts by weight of the oxides). The sodium carbonate increased by 24 p.ct. the gas volume, equivalent to an increase of 12 p.ct. in the thermal yield. The thermal value of the gas, as a result of the addition of calcium carbonate, represented an increase of 5 p.ct., and with iron oxide 2 p.ct. With the addition of calcium carbonate, the ammonia was 35 p.ct. more than with coal alone. Prof. Cobb, with his staff, has been paying a great deal of attention to this subject, inasmuch as he finds there is little opportunity now of increasing the working efficiencies of carbonizing plant (which have reached in some cases 80 to 85 p.ct. where waste-heat boilers are employed) other than by speeding-up the process of carbonization. This was strongly emphasized by him in a contribution to the British Association meeting. It is plain that, if it be possible to change our methods in such a way that we can profitably speed-up the work of the producing plant, with, on balance, financial gain, this will be a valuable addition to the present thermal efficiency; and if, in the process of accelerating work inside the retort, we can also improve the coke, without corresponding disadvantage in any other direction, then the gain will be better still. In fact, Prof. Cobb and his assistants find that, by the addition to the charge of 5 p.ct. of the materials named (this on the laboratory scale), much finer grained, stronger, and more homogeneous cokes are obtained. The hypothesis is that the evolution of volatile matter during the plastic stage is slowed down, and the swelling or honeycombing of the coke lessened on that account. Thus we see that the line along which Prof. Cobb is proceeding, and therefore the one which he obviously believes to be the most promising, is to modify, if possible, the chemical behaviour and reactivity of the coal constituting the charge. Incidentally, it may be noted that the cokes made with lime, oxide of iron, and particularly sodium carbonate, gasify much more quickly, and give better water gas. The Fellowship Report, that of the Gas Investigation Committee, and the paper before the British Association, supply fascinating matter for the consideration of the coal carbonizer.

Great interest has also been aroused in the gas industry by the experiments at the Fuel Research Station on the injection of oil in vertical retorts during carbonization. Various gas undertakings have been making a trial of the idea, in order to ascertain the commercial practicability of the plan, which affords greater elasticity to working. The therm effect with certain coal is alluring; and the system tends in some respects to yield products akin to those generally associated with low-temperature carbonization. Dr. Lander tells us that further research is required before definite statements can be made.

A notable paper at the meeting of the Institution of Gas Engineers was that by Mr. G. M. Gill, who gave a review of the employment of coke-ovens in gas-works, chiefly from his American observations. The report of the Refractory Materials Joint Committee was also a useful document, and contained much information. In place of the detailed reports of the Refractory Association, the researches and the practical findings were summarized. The Committee reported that they had again been considering the clauses in the standard specification dealing with the after-expansion of silica test. But further data are necessary; and the Research Association have been asked to carry out a series of tests on as large a variety of silica bricks as possible. The report of the Committee also aroused considerable interest on the subject of the corrosion of silica retorts. This led to further communications on the subject in the columns of the "JOURNAL," notably from Mr. G. le B. Diamond, of Brighton, and from Mr. A. J. Dale. A paper of outstanding importance and interest on horizontal settings, with special reference to silica retorts, was submitted to the Southern Association, at their last meeting, by Mr. Stephen Hay, of Beckton.

### LOW-TEMPERATURE CARBONIZATION.

Low-temperature carbonization has been very much alive during the year. The report of Dr. Lander, regarding the investigations at the Fuel Research Station, show that there is no pause in the explorations which are being made there into the subject. As a result of that work, he reports that the position of the low-temperature system as revealed by the 1925 report has not altered much, and apparently the work will have to go on for a much longer period. A paper was given by Dr. Lander to the Petroleum Institution on the production of oil from bituminous coal; and Dr. J. G. King, also of the Fuel Research Staff, lectured on the production of liquid fuels from coal to the Notts Section of the Society of Chemical Industry. During the year, an agreement was entered into between, on the one hand, the Government Mines Department and the Department of Scientific and Industrial Research and, on the other, the Gas Light and Coke Company, for carrying out on commercial lines a working-scale test of the low-temperature system. Information was published at various times regarding the progress of other plants. Development took place in the arrangements for the exploitation of the "L & N" process, and privately in connection with at least one other system. A working arrangement was reported to have been effected between Imperial Chemical Industries and International Combustion, Ltd., respecting the development of low-temperature carbonization in connection with powdered fuel firing for steam-raising purposes. A large contract for plant was entered into by the Public Service Electric and Gas Company of New Jersey with the International Combustion Engineering Company of New York. The plant is to have a throughput of 640 tons of coal per 24 hours. Low-Temperature Carbonisation, Ltd., effected a financial re-organization; and they are now putting "Coalite" on the market. In October, it was announced that the prices that were being charged for the material were: Minimum 4-ton truck load, 40s. a ton on rail at works, buyer paying carriage, &c.; orders for not less than five bags at 3s. per bag (80 to 85 lbs.) are only accepted for delivery through local coal factors or merchants. To buy by the 80 to 85 lb. bag therefore works out to about £4 per ton.

### HYDROGENATION OF COAL.

It will be convenient to mention here that information from Germany regarding the Bergius process for the hydrogenation of coal seems to indicate that scientific opinion does not in all quarters regard the prospects of its commercial success as being at all favourable. Much the same views have been expressed in this country. On the other hand, a report from Berlin which was published in the "Daily Telegraph" on Dec. 12 suggested that epoch-making developments in the liquefaction of coal and the manufacture of synthetic rubber are foreshadowed by an announcement that the German Chemical Trust have decided on an early issue of debentures to the nominal value of 250 million marks. The communication proceeds to state that the development of the hydrogenation of coal has advanced according to programme; and that, by the end of next year, the anticipated output at the rate of 200,000 tons annually would "in all probability" be reached. That is not very definite. However, the general view appears to be that the system is yet a good distance from commercial success. If, or when, it reaches that goal, the question is, Will it affect tar from coal carbonization?

### DEHYDRATING GAS.

A large amount of attention has lately been given to the question of partially removing the moisture from gas. This is not surprising when the uselessness of moisture in gas and the trouble and injury it occasions are considered. In our "Correspondence" columns, Mr. C. Harris, of Taunton, called attention to the subject early in the year. Later on, Dr. E. W. Smith was discussing it, and referred to the various systems of treatment. Later, Dr. W. B. Davidson contributed an article in which he discussed the topic from the physico-chemical point of view. Another contributor was Mr. J. Parker. Subsequently—in November—Mr. Harris read a paper on the question at the meeting of the Southern Association. This gave the author's experience with the Holmes "Dri-Gas" process, in which a concentrated solution of calcium chloride is employed. The paper, with the discussion, has so recently been published, and comment made upon them, that we will not go into details in this sketch of points in the year's work, but will content ourselves by saying that the "Dri-Gas" plant is already in operation or under construction in a number of gas undertakings, and those who have had experience of it confirm the results and the costs as indicated by Mr. Harris in his instructive contribution. In this connection, Mr. Thomas Hardie has pointed out that, if the present method of testing calorific value with the gas saturated with water vapour is retained after artificial drying is adopted, it will involve loss of revenue to an undertaking. But Mr. Carmichael and other engineers are of opinion that such a loss is more than neutralized by the gains effected by the process. However, the matter of making an adjustment in the method of testing calorific value is under the consideration of the authorities.

### GASHOLDER INNOVATION AND ACCIDENTS.

In connection with gasholders, there are two prominent events to be noticed this year. One is that the first tankless holder to be set to work in this country was inaugurated in the spring at Ipswich by the Chairman of the Gas Company, Mr. Henry Woodall, M.Inst.C.E. Other holders of this type are being constructed—notably the ones for which orders were placed by the Gas Light and Coke Company. Further discussion took place in Germany regarding the Posen holder explosion. It is believed that tankless holders have come to stay. But many engineers still regard the tar seal as a most critical feature in the new type; and, in all probability, some radical changes will in time be introduced. Mr. Frank Prentice, of Ipswich, in the Presidential Address he delivered to the Eastern Counties Gas Managers' Association, referred, among other merits of the tankless type of holder, to the more uniform pressure it gives than the older types. An address, entitled "Romance of the Gasholder," by Mr. R. B. Hodgson, Chairman of the Council of the Society of British Gas Industries, described the advances in gasholder construction from early forms to telescopic ones, including column-guided, spiral-guided, rope-guided, waterless, and spherical, and referred to their gradual enlargement from a capacity of a few thousand c.ft. to 15 millions.

The second event is that gasholders during the year have broken their excellent record of freedom from grave disaster. There was an explosion on Aug. 23 at the Bradford Road (Manchester) Gas-Works, which wrecked one holder and seriously damaged another. The cause of this occurrence has not yet been ascertained; but the Home Secretary has decided that a public inquiry shall be held, under section 22 of the Factory Act, into the occurrence. The second gasholder accident during the year was at Truro. In this case, the vessel was of the cable-guided type. It is believed that its wrecking originated with an explosion which occurred in a cottage near by. The most terrible occurrence, however, was the catastrophe at Pittsburg, which is believed to have been due to a leakage of gas from one holder into a 5 million c.ft. natural gas holder in which repairs by welding were in progress. It is reported that the death roll reached 28; but according to the "Gas Age-Record," it is believed that the complete list of fatalities will be not less than 50. The number of injured reached something like 400; while estimates of the damage ranged between 2 and 5 million dollars. It is hoped that precise information will be secured from the investigations that are being made into these disasters, in order that public confidence in the safety of the storage of gas may not be undermined.

### DISTRIBUTION.

Regarding distribution there is not much information which calls for notice. The topic of perhaps greatest interest is that dealt with under dehydration of gas, the object of which is to obviate much of the corrosion which proceeds in the distribution system. In our issue for Feb. 16, the specifications of the Wrought-Iron Tubing Committee of the Institution of Gas Engineers were published. In the same issue, Mr. H. C. Widlake, of the Plymouth and Stonehouse Gas Company, made an interesting contribution on the subject of "Remote Control of District Governors." The electrolytic corrosion of mains has received great prominence during the year, particularly through a study of the question by M. Bolzinger, of Nantes, to whom, and the Directors of the European Gas Company, we are indebted for the permission they gave to publish a translation. In connection with high-pressure gas research, several interesting summaries of lectures were published, which were delivered by Prof. W. A. Bone, F.R.S., and members of his staff at the Imperial College of Science and Technology. The lectures were the result of a large amount of investigation which has been made into various aspects of the subject in Prof. Bone's Department of Chemical Technology. For this particular work, the equipment at the College is being considerably extended, and students have been invited to avail themselves of the resources there for obtaining scientific training in this direction. In our issue for Nov. 23, an esteemed engineering correspondent in Scotland contributed an interesting article, which gave rise to correspondence, on the subject of an explosion in a new 24-in. main. Talking of explosions, reminds that there have been several cases in which the fusion of electrical cables has given rise to the generation of gas from the bitumen integument, resulting in explosions, and at Acton and Manchester in fatalities.

### HIGH CAPACITY METERS.

Concerning meters, there has been considerable advocacy during the year of the use of high-capacity meters. Mr. E. C. Holt, of the Meter and Stove Department of the Gas Light and Coke Company, has been especially prominent in this connection. Remarkably little adverse criticism of the new type of meters has been made, but a great deal has been said in favour of them. Their necessity is of a two-fold character: They enable an enlargement of business per consumer through the same meter; and they comply with space availability in industrial and trade premises and modern dwellings. A large number of such meters have been issued by the Gas Light and Coke Company during the past few years.

### COKE-OVEN GAS FOR TOWN PURPOSES.

It is only natural, after the great stoppage in the coal industry, and the cessation which occurred of the supply of coke-oven gas under then existing contracts, that the question of maintaining continuity of supply in future in such circumstances should have been during the year the subject of much consideration. This question of continuity is probably now the most important one in relation to this particular subject; for wide experience shows that suitably situated gas undertakings can, with advantage, enter into business relations with the owners of coke-oven plants for the bulk supply of gas from them, and that the gas can be maintained of the necessary quality in respect of thermal value and purity. The Sheffield Gas Company have entered into an agreement for a further supply of 3½ million c.ft. per day from next autumn, which will make their total custom with coke-ovens 9 million c.ft. per day. The Newcastle-on-Tyne Gas Company have also effected a contract for a bulk supply; and Glasgow has been considering the question of an additional purchase of 2 million c.ft. Reverting to the question of continuity, the view was expressed by Dr. E. W. Smith, before the Midland Section of the Coke-Oven Managers' Association, that the National Fuel and Power Committee should be asked to report on the practicability or otherwise of the extended use of coke-oven gas for town supply, and, if favourable, to determine what means could be adopted for maintaining continuity

and what general principles could with advantage be observed in drawing-up specifications and determining prices. Appended to a paper by Mr. Ralph Halkett, the General Manager and Secretary of the Sheffield Gas Company, before the British Commercial Gas Association at their Southampton meeting, was a copy of one of the agreements which his Company have entered into for the supply of coke-oven gas. This contract is very instructive; and it shows that steps have been taken to ensure continuity by making it a condition that the coke-oven owners shall maintain a stock of coal equivalent to a certain number of weeks' supply of the contracted-for coke-oven gas.

Great interest has been taken in the scheme of the owners of coke-oven plants in the Ruhr coalfield for placing a network of mains over a great part of Germany for the high-pressure transmission of coke-oven gas. Their idea is that they shall become sole producers of gas, and that the gas undertakings shall be reduced to the position of distributors and sellers only. The scheme has been criticized in our columns; and readers have been kept in close touch with the projected development. The gas industry of Germany does not over this matter see eye to eye with the Ruhr coke-oven owners; and therefore, so far, nothing definite has come of the ambitious project, although a fairly considerable business is already being done in the supply of coke-oven gas to gas undertakings in Germany, as is now the case in this country. Members of the Coke-Oven Managers' Association of this country have been to Germany, and have investigated not only the coke-oven plants there, but what is being done in connection with the transmission of coke-oven gas for town supply. This so impressed Mr. C. P. Finn, of the Manvers Main Colliery, Ltd., that, before the Midland Section of the Coke-Oven Managers' Association and at the meeting of the Institute of Fuel, he advocated the adoption of the grid system of gas distribution from coke-oven plants in convenient areas of this country.

### New Gas Legislation.

The National Gas Council have been energetic in all matters appertaining to the general welfare of the gas industry. Without doubt one of the most vital matters with which they have had to deal this year has been the plans for new general legislation for the industry. Their memorandum on the subject has been the basis of much discussion between the Central Executive Board and the Board of Trade, who are very sympathetic and at one with the Council in the opinion that, in order to enable the gas industry to make full development in service to the community, statutory reformation in certain particulars is necessary. The Board referred the scheme to the National Fuel and Power Committee; and they have heard evidence from Prof. Cobb, Mr. Thomas Hardie, and Mr. S. S. Ogilvie. In the Presidential Address of Sir Alfred Mond (who is Chairman of the Committee) to the Institute of Fuel, he incidentally made reference to the investigation by the Committee, and showed his realization of the necessity for reasonable legislation to revise the restrictions under which the gas industry labours. The Gas Companies' Protection Association have approved of the projected legislation; and it was learned from a speech by the Vice-Chairman of the Association (Mr. R. W. Edwards) at the annual meeting—in the absence of Dr. Charles Carpenter, C.B.E., who is now President—that suggestions made by the Association had been favourably entertained by the National Gas Council. At the dinner of the Society of British Gas Industries at the end of May, Sir David Milne-Watson, President of the Council, expressed the hope that the new legislation would be introduced into Parliament next session. The position of the scheme was disclosed by the President at the annual meeting of the Council. From what he then said, it may be assumed that the Board of Trade are giving consideration to the question as to whether the time is not opportune for compelling all statutory gas concerns, except those making less than 20 million c.ft. a year, to adopt the therm system by an appointed day. Up to the present, the Board have not put into force the power which they possess under sub-section 5 of clause 1 of the Gas Regulation Act. At the annual meeting of the Scottish District of the National Gas Council, the matter was also considered and strongly supported. Information regarding it was given by Mr. E. J. Fottrell, Joint Manager of the National Gas Council, in a speech at the meeting of the Irish Executive Board; and there was a discussion of the legislative programme in the Presidential Address of Mr. T. P. Ridley, to the North of England Gas Managers' Association. He particularly enlarged upon the need for greater latitude in capital raising, on the incorporation of a minimum dividend in the sliding-scale, on new methods of charging for gas, amalgamation of the smaller undertakings with larger and more economically placed ones, release from the one-third limitation in respect of purchase of secondary products by gas undertakings, and, further, he expressed himself as favourable to the £1 instead of £100 denomination of gas stock.

The importance of the less economically situated gas undertakings being absorbed by the larger concerns, and the question of revision of the system of charging for gas, with a view to encouraging consumption, have been the two main topics of consideration. Amalgamation is, of course, no new thing in the gas industry, and, latterly, many of the larger undertakings have been proceeding with the incorporation in their areas of the districts of their smaller neighbours. This process is likely to be accelerated when the projected legislation becomes law. In this connection, the National Gas Council were successful in obtaining for statutory companies a remission of stamp duties. When the Finance Bill was introduced, it proposed in the case of amalgamations between limited liability companies to remit the capital duty and transfer duty. Representations resulted in the Treasury agreeing that the concessions should be extended to statutory companies. The Council are now moving for securing like concession in respect of amalgamations with municipal gas undertakings. The various aspects of multi-part tariffs have been considered fairly extensively during the year; and an important contribution to the subject was made through our columns by the reprinting of the contents of a pamphlet issued by the American Gas Association on "Better Forms of Rates for Gas."

### Gas Regulation Act.

There has not been this year a considerable number of applications for Orders under section 1 of the Act; and the same applies to amending applications. But good use has been made of section 10 of the Act, which governs Special Orders; and many inquiries into applications have been held in London and the Provinces by the Director of Gas Administration, Mr. J. F. Ronca. In the early part of the year, review was made of the useful compilation issued annually by the National Gas Council of the position of the applications for Orders under section 1. In this it was shown that, in regard to calorific values, the zone of greatest popularity is between 450 and 500 B.Th.U., included in which we have no less than 485 of the 579 gas concerns dealt with, or 83·76 p.ct. Below 450 B.Th.U. and running down to 200 B.Th.U., there were 69 declarations. Above 500 B.Th.U. and running up to 600 B.Th.U. there were 25.

### Recording Gas Calorimeters.

At length we have arrived at the inception stage of the application of recording calorimeters to official testing of calorific values under the 1920 Act. In the minutes of the Central Executive Board of the National Gas Council, published in September, it was reported that the Gas Referees were contemplating requiring the Metropolitan and some of the larger provincial gas undertakings to provide at least one recording gas calorimeter, to be brought into use for official testings as from Jan. 1, 1928. The notification indicates that the Gas Referees prefer to bring about the adoption of recording calorimeters progressively, probably with a view to enabling individual inspection and observation in the varied circumstances in which the instrument will be installed. In the address of Mr. W. J. A. Butterfield, as Chairman of the London Section of the Society of Chemical Industry, there was remarkable testimony to the degree to which the gas industry maintained unimpaired its calorific value during the coal stoppage. For that period testing by independent official gas examiners gave definite information regarding the calorific value of about 71·5 p.ct. of the gas supplied by authorized gas undertakers in Great Britain. Regarding 70 p.ct. of the gas thus tested, the calorific value was maintained throughout the stoppage. In respect of 20 p.ct., the average defi-

ciency in any quarter was less than 5 p.ct. Therefore of the 71·5 p.ct. of the gas sold and tested officially, only 10 p.ct. in any quarter of that difficult period was more than 5 p.ct. lower in average calorific value than it would have been in normal times. This is excellent testimony to have on record—especially coming from one of the Gas Referees.

### GAS TRADING—AFTER THE COAL STOPPAGE.

The reports which were issued by gas companies at the beginning of the year, and later by municipal concerns, showed at what enormous cost the gas supply had been maintained during the coal stoppage by the purchase of coal from abroad. Fortunately, however, good prices were obtained for coke and tar—due, so far as coke was concerned, to the shortage of fuel, and in respect of both coke and tar owing to the fact that the coke-ovens were put out of commission during the stoppage. The reduced post-stoppage demand for metallurgical coke has also been a factor in the secondary products market this year, and an incentive to the coke-oven owners to consider the question of new markets for coke with a view to having more than one string (and that an unreliable one) to their bow.

Another revelation of the annual gas reports was that, despite the appeal for economy in gas consumption during the stoppage, new connections and the cultivation of the gas habit caused increases in gas consumption representing for different undertakings varying percentages from small to large. But when the Board of Trade returns were issued, they showed that the average increase of business was nothing that could be regarded as more than normal. It supplied the answer to the riot of complaint that was made in certain newspapers when the March accounts were rendered regarding a "mysterious" advance in the demands of gas undertakings, which advance was, of course, due to extra consumption and the higher prices which were the obligation of all users of gas in contributing to the discharge of the cost of maintaining for them the means of lighting, cooking, and heating through the stoppage. However, the foolish agitation was not of long duration; and it came to an end with the gradual reductions that were made, and the departure from winter's conditions to those of spring and summer—if summer we really had. Many gas undertakings are now supplying gas at, or below, the prices existing at the time the coal stoppage began.

In addition to the Board of Trade returns, Mr. H. E. Ibbs, in "Field's Analysis," and Mr. F. J. Bradfield, in his analysis of the "London and Principal Suburban Gas Companies' Accounts," gave some remarkable figures regarding the experiences of the gas industry in the coal stoppage year. The material which those experiences provided likewise gave scope for highly interesting statements at the annual meetings of gas proprietors early in the year—notably by Sir David Milne-Watson at the meeting of the Gas Light and Coke Company, and by Dr. Charles Carpenter at that of the South Metropolitan Gas Company. An event of the year has been the consummation of the arrangements for mutual working between the South Metropolitan Gas Company and the South Suburban Gas Company. The latter are promoting a Bill in the ensuing session of Parliament which will, *inter alia*, bring their statutory conditions into closer harmony with those of the South Metropolitan Company.

### INCREASING COMMERCIAL ACTIVITY.

The gas industry has no intention of taking anything for granted—such as that the Government scheme of centralized electricity generation and transmission will not produce the expected effects. We have our individual opinions regarding it; but we also know that the object of the scheme is to make the electricity industry more effective in gaining new business, which would be largely at the expense of the gas industry. It is that object we have to keep in view, and not our personal ideas as to whether or not an egregious error has been made. The proposed new gas legislation has in view the giving of a freer rein to the industry in serving the public and in meeting competition on a plane of greater equality. The central organizations are asking the industry to give them the wherewithal to advance their operations through the work of the National Gas Council, the propaganda and educational operations of the "B.C.G.A.," and the research work of the Institution of Gas Engineers. All are essential; and there should be good response.

Local activity is finding more and more expression in the advertising columns of the newspapers, in making use of opportunities, and in the adoption of new methods to meet the greatly expanded plans of our competitors—such as hiring, hire-purchase, assisted wiring, and two-part tariffs. Showrooms are being developed. In this respect, the old order has changed. A showroom is not worthy of the name that is hidden away in a back street, is a gloomy-looking place, and made as unattractive as an old-metal dealer's shop. Progressive gas undertakings get out into the main shopping thoroughfares, and present an attractive face to all, and inside have gas equipment staged in a manner that is worth looking at, and is demonstrative. They testify to being really part and parcel of local life and service, and not on a level with a struggling tradesman in a small way of business, who is not quite sure whether or not he ought to be in existence. We have during the year published many illustrated descriptions of new showrooms designed and equipped in modern style—an example to those concerns which are still living in the past, and are unmindful of the present and future. Gas has taken good part in many exhibitions during the year; and to these our makers of gas appliances have generously contributed. They will be doing so again in the coming year, and one of the first events will be the Gas Section which is being organized for the British Industries Fair at Birmingham.

Unceasing have been the activities of the British Commercial Gas Association, to which, we learned from the report submitted by the Executive Chairman (Mr. F. W. Goodenough) at the annual meeting at Southampton, no less than 93 p.ct. of the gas supply of the industry subscribes. That meeting was a remarkable one. With the exception of an unfortunate accident to Sir Russell Bencraft (the President), which prevented his presence, everything subscribed to making it a memorable occasion—address, papers, attendance, enthusiasm, and the warm welcome which the Southampton Gas Company and the municipal authorities prepared for their visitors. To the topic then considered and discussed by the members, the various District Conferences made contribution of high merit on the many phases of current development—particularly service to the consumers, and the part the industry is taking, by practical work, in the smoke abatement movement, and thus the promotion of healthier conditions.

The coming year will see the maintenance of the high standards of our "Gas Service" Association under the presidency of Mr. Alfred Procter, the Chairman of the York Gas Company.

The Gas Salesmen's Circles continue to prosper, and are developing the outlook and knowledge of the members of gas undertakings' staffs engaged in the promotion of business among the public.

The Smoke Abatement Act came into force on July 1; the only thing to regret about it being that it does not go far enough in rendering assistance to those who are in a position to help in this highly important work. However, the gas industry has shown what it is doing in this regard through several papers and lectures—an especially good one to which to make reference by those who may require data on the subject being that by Mr. Goodenough at the Public Works, Roads, and Transport Congress in November.

### MAINTENANCE AN ESSENTIAL.

The policy of maintenance as part of essential service to protect and advance business has during the year received much stimulation, and many of the old obstructive ideas are falling, and the facts of the situation are being accepted more freely. The notion that if gas is supplied economically and efficiently up to the meter, defect and inefficiency may reign where it is used, is too absurd for sustained existence. It is being made clearer that, if common sense does not produce the necessary change, then competition will reap advantage, and produce a much-needed enlightenment. Among the movement of the year in the propagation of the policy of maintenance was the great conference in February, at the Institution of Mechanical Engineers, which was organized by the Institution of Gas Engineers and the "B.C.G.A.," with Mr. John E.

Cowen, Chairman of the Newcastle-upon-Tyne and Gateshead Gas Company, presiding. After a full debate, a resolution was adopted which pronounced the view of those assembled that a system of periodical inspection and maintenance is essential to the permanent prosperity and future progress of the industry, and to the complete fulfilment of its duties to the community. The cost and the contra gains of carrying out the policy were prominent in the discussion; and the gains are assuredly worth the first cost, when protection and advancement of business are taken into account. Another point was that every possible facility and encouragement should be given to the training of the personnel necessary for carrying out maintenance work. In preparation for the conference, we published a supplement, which was much appreciated, reviewing experiences in the inspection and maintenance of consumers' appliances. At many meetings the subject was brought forward in the course of the year—notably in the admirable paper by Mr. J. H. Canning at the meeting of the Institution.

### Gas Applications.

The contributions to the utilization of gas in domestic, public, and industrial service defy any adequate mention in what can at best be the merest sketch of the events of the year. We must content ourselves with saying that in respect of lighting the productions of our lighting engineers are to-day as far removed from the conditions of the past as is the most exquisite motor-car from the old horse-drawn four-wheeler. Public lighting has come in for much attention, particularly at the meeting of the Institution of Public Lighting Engineers and the Public Works, Roads, and Transport Congress. The British Engineering Standards Association issued their specification for street lighting; and it has been much discussed. As to gas cookers, there has been considerable controversy over the designs and preferences of makers, but outstanding is the fact that the higher efficiency cookers, and those to which means of heat control are attached, are receiving increased adoption. More and more undertakings, too, are changing the hotplates of hired cookers in their areas, as occasion allows, to more modern types. Gas-fires have continued their march in popularity; and the pace has been accelerated. We shall soon have on the market a development which will increase the radiant energy of gas-fires without the scorching effect which has hitherto accompanied advance in this direction. Therapeutic virtues are also claimed. The Seventeenth Report of the Gas Investigation Committee dealt with the combustion products from gas appliances and the effect of increased aeration. The document emphasized that there is still a field for investigation in devising a radiant which will yield the maximum radiant efficiency, with the minimum carbon monoxide production. In connection with heating, the campaign against flueless houses has been carried on unremittingly during the year—not only by the gas industry, but by others who have consideration for health. An important contribution to this subject is the report by Mr. A. H. Barker on his study and experimental investigation regarding the effects of the presence or absence of flues in bedrooms, which was presented at the annual meeting of the "B.C.G.A." The Fuel Research Board have now a Building Research Station at Watford; and it is hoped that there the attitude of the gas industry regarding flueless rooms will receive confirmation. There has been much interest in published contributions respecting the development of gas in the manufacturing and trade operations of the country. Mr. Barker towards the end of the year introduced to notice the gas-panel system of heating.

### Institution Education Scheme.

The outstanding event in this connection has been the revision of the scheme in directions which experience has suggested. This followed a conference held between the Advisory Committee and representatives of the Junior Associations of England, Wales, and Scotland. The changes that have been effected should go a long way towards increasing the number of students; and, while not departing from the fundamental principle that the scheme is for the realization of higher qualifications in the men aspiring to technical status in the industry, relaxation in certain requirements has been made to meet the cases of isolated students and older men. District Education Committees have also been set-up, which is an excellent move in the general interests of the industry and of training within and for it. The examiners in their report this year had again some adverse criticism to make concerning the general educational qualifications of some of the candidates, the insufficiency of preparation, and the poorness of the quality of sketches. The criticism does not, of course, apply generally to the candidates, but the defect was in sufficient evidence to make an impression on the examiners. Prof. Cobb, in his annual report on the work of the Department of Coal Gas and Fuel Industries, regretted that greater interest is not shown, by an increased entrance of students, in the important subjects which come within the province of the Department.

### The Stock Market.

It was only natural that at the beginning of the year, in view of increases in the price of gas, market values of gas stocks should have had a drooping tendency. But although in a large number of cases pre-coal stoppage prices for gas had not been fully recovered before half the year had expired, the trend of values has since been in the upward direction. But comparing the first stock market report given in the "Journal" in January with the last issued at the time of writing, in most cases the variations up or down are not of striking amount. We should think it may be anticipated that, with the publication of company reports at the end of next month or during February, the slight increases which have been made in market values will receive further increment. It has to be remembered that not only did the coal stoppage have effect, but the investing public have been faced by the widespread electric propaganda backed by the Government and Government Departments. That propaganda, however, is losing effect, as the public have now been fairly well assured that the great hopes which were foreshadowed as to the results of the electricity scheme have been greatly minimized as the facts of the situation have been revealed. Among the companies which have made the best increases in market values during the year are Alliance and Dublin, British, Cardiff, Derby, Sheffield, South Metropolitan, South Suburban, and Tynemouth. Nearly all along the line, with the exception of Imperial Continental, prices of foreign gas company stocks have improved during the year. New issues of home gas stocks have been taken up well, at favourable prices. This year our Stock Market Correspondent has commenced contributing at intervals a valuable series of articles on "Potential Investments." So far, he has dealt with the Gas Light and Coke Company, the South Metropolitan Gas Company, the Sheffield Gas Company, the Newcastle-upon-Tyne and Gateshead Gas Company, and the Liverpool Gas Company.

### Labour.

In the gas industry, all has been well in this regard, if we except minor differences of a local nature which have been settled through the Industrial Council for the Gas Industry. There was considerable satisfaction that the Council were able to stabilize wages until June 30 next. The South Metropolitan Gas Company succeeded in reconstituting their various provident funds—unemployment, sickness, and superannuation—into a single comprehensive scheme, to be known as the Co-partnership Insurance Fund, and they obtained the right to contract-out. This constitutes the first contracting-out scheme to be approved by the Minister of Health. The Trades Disputes Act was passed after much opposition by the Labour-Socialists and the trade unions. Its objects are well known, and do not need recapitulation. The labour history of the year is a spacious one; and all we can say here regarding it is that birth has been given to a new spirit—that those who are the real leaders in the labour world have had enough of the wrecking tactics of the extremists, and are persuaded that the best interests of the workers lie in the collaboration of the unions with the employers. Not an insignificant part of the unemployment in the country is due to interference with industry and trade by the disruptive forces that have had sway from the labour side.

The General Council of the Trade Union Congress last Tuesday week resolved to accept an invitation from the

principal employers of Great Britain to a joint conference, with the view to discussing, without prejudice, the industrial problems facing the country. The invitation was signed by prominent men in all the large industries—the gas industry being represented by Sir David Milne-Watson. The T.U.C. General Committee appointed a Special Committee for the purpose of the consultations—Mr. Ben Turner, Mr. Will Thorne, M.P., Mr. J. H. Thomas, M.P., Mr. Arthur Pugh, Mr. T. Richards, and Mr. Walter Citrine, Secretary to the T.U.C.

### IN CONCLUSION.

There are many matters on which we have not touched. It is impossible within reasonable compass in such a review to follow the work of the industry in all its ramifications. We have not dealt individually with the work of our various organizations, but simply incidentally referred to it when the subject-matter has been appropriate. Much could be said, for instance, as to the splendid work of the Institution during the presidency of Mr. John Wilkinson, and since under that of his successor, Mr. H. D. Madden. Also of the proceedings of the Society of British Gas Industries, of our District Associations, of the Junior Associations, and of various other organizations which have part or lot in the industry's affairs. Among the constructive work (Mr. Madden has publicly alluded to this) is that the Institution are taking steps to include in their membership men of technical qualification associated with the manufacture of gas plant and apparatus. This will be the consummation of a very old desire, and should bring into full collaboration the technical talent of the industry. The Southern Association have already taken a similar step. Other subjects which have been somewhat prominent during the year have been the question of railway rates and proceedings under the Rating and Valuation Act of 1925. The National Gas Council have both these matters under constant surveillance. Regarding the new Rating Act, Mr. Arthur Valon made contributions to our columns explanatory of the machinery and procedure.

Having regard to all the circumstances of the year, this review shows that in many respects it has been one of constructive importance to the interests of the industry. From the work which has been done or initiated, we shall benefit immensely in the future. Of that there can be no doubt. Nevertheless, the conditions by which we are surrounded urge every responsible man in the industry to do his part enthusiastically and thoroughly, in order that we may still maintain, as an industry supplying light and labour-saving heat and power, the pre-eminent position which we have hitherto enjoyed. So resolving, we shall succeed. We close this review of 1927 with the cordial wish—

**Prosperity to the Gas Industry and to All Engaged in it.**

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### Free to "Journal" Subscribers.

The "JOURNAL" office is now dispatching to every subscriber, at home and abroad, a free copy of the "Gas Calendar and Directory" for 1928. During the years of its issue at 7s. 6d., this annual work has grown in popularity—not only in the gas industry, but in kindred ones. "*Multum in parvo*" was the remark of one chemical-engineering friend when he saw the book for the first time this year. He was right; for, in addition to the diary, on most technical subjects in which the professional gas man is concerned, he will find information definite and comprehensive but in tabloid form. The work is that of Dr. W. B. Davidson, who annually revises and extends the subject-matter as developments prompt. Included is a gas undertakings directory, with gas make, calorific value, price, and the names of chief officials given. At the back of the book, we have practically a directory of most of the principal firms who are part and parcel of our industry. It may save trouble if it is mentioned here that anyone who is not a "JOURNAL" subscriber can obtain a copy of the "Calendar" at the old price of 7s. 6d., which is also the charge to a subscriber for each copy required in addition to the one to which he is entitled.

### A Christmas Box to Consumers.

Regarding the announcement of the Gas Light and Coke Company of a further reduction of price of two-fifths of a penny (0·4d.) per therm from the current reading of the meter index figures, Mr. F. W. Goodenough tells us that this nice Christmas-box makes the fourth reduction in price in twelve months. The reductions made since the March quarter total 3d. per therm (or 1s. 3d. per 1000 c.ft.), and represent a saving to the Company's consumers at the rate of £3,000,000 per annum.

### The "Gas Salesman."

With this issue is published the "GAS SALESMAN" Supplement. Its contents include references to the new low-temperature panel system for room and hall heating, in which gas is used. Reports appear of the recent meetings of the Midlands and the Lancashire (Manchester District) Circles. Points are also published regarding the competition of gas and electricity.

### Domestic Coal and Gas Fires.

The people of London do not like the increase of 2s. per ton made by the coal merchants at the end of November, and Col. Lane-Fox, Secretary for Mines, is of opinion that it was not justified. He has been making inquiries into the matter, and finds that there has been no increase in pithead prices, and, moreover, at least two co-operative societies of considerable influence, and one large firm of merchants, have not seen any necessity for making the advance. Nevertheless, the other coal merchants have told Col. Lane-Fox that in the summer time they reduced the price of coal by 10s. to 11s. per ton, which was more than was justified by the reduction in pithead prices. They did this with a view to winning back the domestic trade which had been lost, in consequence of the installation of gas, electric, and oil stoves during the miners' stoppage last year, and to comply with the request of the collieries that they should encourage summer trade as much as possible in order to keep the miners employed. They alleged that the public took advantage of their generosity to a greater extent than was anticipated; and, therefore, the loss was a serious one. This being so, they submit that the 2s. is designed to restore the retail part of the trade to an economic basis. But the fact remains that the inquiries of Col. Lane-Fox have not satisfied him that the increase was either necessary or justified. The Government have no power of control over retail coal prices; and the advice given by the Secretary for Mines is that the public should deal with the matter themselves by making their purchases through those who will supply them at the price which ruled before the 2s. was applied.

### Contractors and Hire-Purchase.

In the gas industry we have nothing akin to the Electrical Contractors' Association; but it may be interesting to our manufacturers of gas-using appliances to learn that the Electrical Contractors' Trading Committee have recently been making progress with a scheme for forming a company to finance hire-purchase business. It is expected that the new venture will be inaugurated shortly. Referring to the matter, the "Electrical Review" says it hopes that those who are directly interested in this project, and many other leaders in the industry, will consider whether the time is not suitable to start out upon a really big scheme for making-up the trading deficiencies that exist—that is to say, in the electricity industry. It refers to "recent authoritative speeches" which have stressed the enormous importance of distributing electricity to everybody, and, therefore, securing that everybody shall be provided with the appliances for its utilization. Apparently our contemporary is alluding to the Presidential Address of Mr. Archibald Page (Chief Engineer of the Central Electricity Board) to the Institution of Electrical Engineers, in which he made it abundantly clear that the great electricity scheme would not avail much unless the demand for electricity was greatly augmented by the efforts of the local purveyors.

## OBITUARY.

### DEATH OF LADY WOODALL.

It is with sorrow that we have to announce the death, on the 22nd inst., of Lady CORBET WOODALL in her 89th year, at Admirals Walk, Pirbright, Surrey. The event carries memory far back. Lady Woodall spent a life of great reality as wife, mother, and friend. Her uniform kindliness endeared her to all who came in contact with her. Many will remember her charming reception, at "Walden," Chislehurst, of the members of the Institution, with their ladies, in 1913—the Jubilee Year of the organization, when Sir Corbet was the President—on the unanimous invitation of his professional colleagues.

## FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

**Jan. 10.**—NATIONAL GAS COUNCIL.—Meeting.
**Jan. 10.**—FEDERATION OF GAS EMPLOYERS.—Meeting.
**Jan. 26.**—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Jubilee dinner, followed by cabaret, at the Queen's Hotel, Birmingham.

INSTITUTION OF GAS ENGINEERS.

**Jan. 9.**—Emergency Committee. Finance Committee.
**Jan. 10.**—Gas Education Executive Committee.

## ELECTRICITY SUPPLY MEMORANDA.

THE Electricity Commissioners have issued their report on the achievements of the electricity industry during the year 1926-27. They are rather proud of the progress made in the seven years of their administration; but from the published summaries, it appears that, in their modesty, they have not taken any credit to themselves for what has been accomplished. Perhaps that is very proper, seeing that their functions have been judicial, and have had nothing to do with the immediate management of the concerns. Of course, things will now be somewhat different under the rule of their allies, the Central Electricity Board. However, it is pointed out that there has been a rapid increase in the scope of operations of the industry; large amounts of capital have been expended; modernization and enlargement of generating plants have been carried out; despite depression of industry and trade, there has been a progressive increase in the sales of electricity; working results have steadily improved, particularly in regard to the costs of generation; sensible reductions in charges have been made; and there has been a general strengthening of the financial position of the industry. Looking at all this, it causes one to wonder why there was any necessity for the 1926 Act. The report tells us that between 1921 and 1926 the sales of electricity for power purposes increased by 50 p.ct., while the sales for lighting and other domestic purposes rose by 113 p.ct., and in the same period the charges were reduced by an average of 33 p.ct. The actual sales of electricity in 1926 by authorized undertakings amounted to 5723 million units, which represents an increase of about 57 p.ct. on the sales in 1922, and an average consumption of approximately 130 units per head of the estimated population. Comparing the official statistics for 1920-21 and 1925-26, it is found that the sales of electricity for power purposes increased during the five years from 2499 to 3760 million units, or by 50 p.ct., and that sales for lighting and other domestic purposes increased from 582 to 1244 million units, or by, as already stated, some 113 p.ct. The figures, of course, take no account of the supplies for traction purposes generated at the stations of railway and tramway authorities, or of the supplies used in manufacturing and trading operations derived from privately owned generating plants.

**Commissioners Report Progress.**

In a tabular statement, it is seen that in 1922 the number of units sold was 3,645,190,732; and in 1926, 5,723,653,523. If we convert these figures to the thermal basis, we find that the sales in 1922 represent 124,373,907 therms, and in 1926 195,291,058 therms. Therefore, the increase in the consumption of electricity for domestic and industrial purposes during the five years represents 70,917,151 therms. It will be interesting to compare these figures with the increase in the sales of gas during the same period, taking the cubic feet totals from the annual Board of Trade Return for statutory undertakings. In 1922, the sales of gas by statutory undertakings totalled 232,602,789,000 c.ft., while in 1926, the sales amounted to 276,568,647,000 c.ft. Taking 490 B.Th.U. as being approximately the average calorific power of the gas, we find that in 1922 the consumption was 1,139,753,666 therms; and in 1926, 1,355,186,370 therms. Therefore in the five years the sales increased by 215,432,704 therms. In other words, the increase in the consumption of gas in terms of calorific value has increased over three times more than has electricity during the same period. That is an interesting comparison. However, we know that the Electricity Commissioners have great expectations in regard to future consumption. They anticipate that the sales of electricity will reach 19,160 million units by the end of 1941, representing an average consumption of 448 units per head of present population. These expectations are not shared generally by electrical men. It is also interesting to note that between 1922 and 1926 the average revenue per unit sold fell from 5·75d. to 3·32d., or by over 33 p.ct., in the case of supplies for lighting and domestic purposes; from 1·69d. to 1d., or by 41 p.ct., in the case of power supplies; from 2·48d. to 1·65d., or by upwards of 33 p.ct., for all classes of consumption taken collectively.

**The Rival Increases.**

The Commissioners report a steady progress in the concentration of generating plant. They also refer to a notable improvement in the efficiency of plant equipment due principally to a continuous advance in the design and manufacture of steam-turbo units, and to the widespread adoption of such units, even in the smaller stations. Important economies have also been effected in the utilization of coal in generation, due, among other factors, to the extended use of steam-turbines, and to improvements in the design and operation of steam-raising plant. The average consumption of fuel (coal, coke, and oil, expressed as equivalent coal) by the steam-generating plant of authorized undertakers shows progressively a decline from 3·42 lbs. per unit generated in 1920-21 to 2·43 lbs. in 1925-26, which represents an all-round increase of 41 p.ct. in the amount of electricity produced per ton of fuel consumed for the purpose. Even so, the average efficiency of generation on a basis of 12,500 B.Th.U. per lb. of coal used is only a little over 11 p.ct. Among other prominent features of post-war developments, the Commissioners notice the increase in the use of overhead lines for the transmission and distribution of supplies in rural and other areas outside the more congested centres of population. Some 1000 applications relating to the establishment of overhead lines have been dealt with by the Commissioners during the past seven years. Assent has been given to practically all of them.

**Generation Economies.**

The Central Electricity Board apparently are going to sit tight upon their decision not to hold a public inquiry into the South-Eastern electricity scheme, although the appeal for one was made by the major part of the undertakings in the territory embraced by the project. The matter was raised by Mr. Barnes and Mr. Scurr in the House just before the prorogation of Parliament; and they both thought that a case had been made out for investigation. But the Minister of Transport (Lt.-Col. Ashley) made it clear that a public inquiry is not likely to be conceded. Absolute discretion as to what sort of inquiry should be held, he declared, rests with the Central Electricity Board, and with nobody else. Lt.-Col. Ashley seems to think that what the Board have already done suffices. The Chairman and the Chief Engineer, he stated, have visited practically all the big interests concerned, and have held informal conversations with them. They have also had several interviews with the Joint Electricity Authority of London. That, however, is not the same thing as a definite, penetrating inquiry where evidence can be given. Enormous interests are involved; and mere superficial investigation, such as is obtained by visits and conversations, appears to our mind to be totally inadequate to the case. The Minister of Transport took the trouble to mention that the members of the Board are men of business, of high character, and of outstanding public attainments. Nobody has ever suggested they are not. The singular thing is that, being all this, they have not seen the wisdom of acquiescing in the widespread demand made by numerous "men of business, of high character, and of outstanding public attainments."

**The Omnipotent Board.**

The Intelligence Department of the Electrical Development Association is not yet in a position to publish a complete report on the results of the National Electric Week, which was held early in December. But they do know that 720 electrical shops made the complete special "E.D.A." window display. Several thousands of others made exposure of the "National Electric Week" window poster. Advertisements appeared in 230 newspapers; composite electrical pages were published in the newspapers of

**National Electric Week.**

many towns; over 300 newspaper articles are known to the Association. Posters had place on 700 buses; and twelve special electrical pages appeared in the Press. It is curious that we have not personally come into contact with a single instance of any of these things, save a few specimen articles which have reached us from the provinces. The effort was intended to be "national;" but the evidence all points to the fact that it was not. About the Circle Campaign, which continues to the end of next March, it is stated that there are now in existence 107 electric circles in different parts of the country. To the number of 74, demonstration electric houses and exhibitions have been organized. The lecture service panel now boasts 200 lecturers and lecture secretaries, and 91 engagements for the delivery of lectures have been made.

**Electric Blankets.** Writing at a time when the mercury in our thermometer is doing its best to force its way out of the bottom, we happen to come across a paragraph describing an electric blanket. There is a comfortable feeling, with atmospheric conditions what they are, in contemplating a blanket of any kind. We read, however, that at one corner of this blanket there is a length of flex and a plug, which enable it to be used in any room where there is electric light. As we have no electric light in our bedroom, the blanket would not be serviceable; but after reading of fatalities which have occurred through the presence of flex and electric connections in bedrooms, we think, if our bed requires warming, the old hot-water bottle will suffice, and thus obviate the risk of electrocution.

**Miraculous Heat.** Heat provided by electricity, in the electrical imagination, has virtues far in excess of heat provided by any other agency. It is a physical phenomenon which we will not try to fathom. According to "Hotspot" in the "Electrical Times," an electrical B.Th.U. will do as much work as 3·7 B.Th.U. supplied by the combustion of gas. It is wonderful. But if the infallible "Hotspot" says so, it must be so; and the gas industry must accept his ruling, or at any rate as much of the industry as has not the ability to use its own brains. This "authority" on heat was discussing the price at which electricity for large-scale cooking and heating was competitive on a purely fuel basis with gas and other heating agents. The answer he gives is that, in general, the price of gas corresponding to electricity at 1d. per unit is 8d. per therm. A pennyworth of gas at 8d. per therm will give the consumer 12,500 B.Th.U.; and the educator of electrical opinion on the subjects of cooking and heating contends that all this heat has to be expended to do the same work as 3412 B.Th.U. supplied electrically. We are pleased to say we totally disagree with such unadulterated piffle; and we shall be glad to learn where he can prove to us the correctness of his assertion, under conditions that are equal in all respects. Just think of the initial and (in use) dwindling efficiency of the electric hotplate on which so much of the work of a household would be done, and then of the fact that there is no such depreciation of efficiency with a boiling-burner on the hotplate of a gas cooker; just think of the electric fire giving between 90 and 100 p.ct. of the heat of a KW.-H. (3412 B.Th.U.) to a room, and a gas-fire 75 p.ct. in radiant and convected heat (75 p.ct. of 12,500 B.Th.U., at 8d. per therm). It is nonsense such as this gas/electricity thermal ratio of 1 : 3·7 that misleads householders; it is when they learn the truth of the matter that they seek to have gas reinstalled, if they have not been foolish enough to bind themselves for a given period to pay the hire of electrical appliances, or to purchase the goods on the instalment system. Anyway, many gas undertakings in proximity to the coal-fields are now supplying gas at about 6d. per therm; they are at liberty to make use of "Hotspot's" view of the equality of 1d. per unit and 8d. per therm, and to heap further ridicule upon it.

**Mishaps.** A report from Paris states that on Saturday, Dec. 17, at the Paris Opéra, during the second act of "Valkyrie," all the lights went out and abruptly interrupted the scene between Sigmund and Sieglinde. We are sorry for them; but they were able to resume a quarter of an hour later when the light was restored. On the 7th inst., John Jones, employee of Messrs. Williams, Electricians, of Clydach, Swansea Valley, met with his death through receiving a shock of 220 volts. It appears that he was sitting in a chair with his feet on a table, when one of his feet slipped, and smashed an electric fire. The apparatus became alive—hence the fatal shock. From Bordeaux comes the news that on Dec. 11, as the result of a motor car crashing into a pole carrying a high-pressure cable, three persons received fatal electric shocks, and three were injured. The falling of the cable killed one of the passengers; two pedestrians, who endeavoured to render help, were also killed. Passengers in a train from Waterloo, on Tuesday evening last week, noticed smoke rising from the floor, and pulled the communication cord when near Wimbledon Station. The trouble was caused by the fusion of two electric wires. The coach had to be detached, and shunted to a siding. The misbehaviour of the two little wires held up the traffic on this great arterial line for no less than an hour. On the 19th inst., there was a mishap to an electric main in Preston, which caused considerable inconvenience to tradesmen and Christmas shoppers in the important neighbourhood of Fishergate. On the 20th inst., a failure of the electricity supply occurred at Crosby just after six o'clock in the evening, and was not remedied for nearly an hour. The village receives its supply from the Liverpool Corporation.

## COAL AND BYE-PRODUCT EXPORTS.

The last-issued Board of Trade returns give information as to the position of exports and imports to the end of November. Generally, the results are satisfactory, with the probable exception of the statistics referring to the coal industry, though those are better than might have been expected.

### COAL EXPORTS.

The total quantity of coal shipped abroad in November was 4,126,745 tons, which compares with 5111 tons in 1926, and 4,337,768 tons in 1925. The values were: 1927, £3,414,624; 1926, £5724; 1925, £3,986,720. Business in gas coal was represented by 2,906,714 tons, as against 292 tons in November, 1926, and 3,044,928 tons in November, 1925. The values of these quantities of gas coal were: 1927, £2,362,631; 1926, £1146; 1925, £2,680,831. The average value per ton in November was 15s. 4·2d.

The shipments of coal for the eleven months amounted to 47,262,788 tons, which is better than in 1925. The value, however, was nearly £4,000,000 less, though the quantity was nearly a million tons more. The comparative figures are for 1926, 18,987,802 tons, and 1925, 46,185,067 tons. The values were: 1927, £42,405,921; 1926, £17,252,588; 1925, £46,201,851. In these figures, gas coal is represented by: 1927, 6,087,392 tons; 1926, 2,491,787 tons; 1925, 6,225,547 tons. The values of these tonnages were: 1927, £5,035,653; 1926, £2,032,988; 1925, £5,791,024.

### GAS COKE SHIPMENTS.

Smaller business was done in gas coke in November than was the case in the same month of 1925. The shipments amounted to 117,183 tons, compared with 7 tons in 1926, and 149,312 tons in 1925. The value in November was £120,878, compared with £25 in 1926, and £143,611 in 1925. The average value last month was £1 0s. 11·8d. per ton.

In the eleven months, the aggregate business in gas coke has been good, the total shipments being 883,322 tons, which compares with 383,429 tons in 1926, and 719,417 tons in 1925. The values were: 1927, £924,122; 1926, £395,517; 1925, £790,146.

In the eleven months, metallurgical coke only figures for 692,897 tons, compared with 374,652 tons in 1926, and 1,103,837 tons in 1925. The values were: 1927, £803,276; 1926, £428,545; 1925, £1,328,146. These figures show how severely the coke-oven industry has been affected during the past two years.

### TAR PRODUCTS.

The business in benzole last month amounted to 59,455 gallons, which makes the total exports for the eleven months of this year 1,294,585 gallons, as against 420,587 gallons in 1926. Naphtha exports have in the same period only succeeded in reaching a total of 58,170 gallons, compared with 64,947 gallons in the eleven months of 1926. Tar, oil, creosote, &c., were shipped in November to the amount of 4,955,970 gallons, as against 402,173 gallons in November, 1926. In the eleven months, the total of these products was 35,940,667 gallons, as compared with 34,627,003 gallons in 1926.

### SULPHATE OF AMMONIA.

The purchases by other countries of sulphate of ammonia in November figure for 20,807 tons, as against 7494 tons in November, 1926. The total quantity shipped in the eleven months ended November was 239,112 tons, against 156,762 tons in the corresponding period of 1926. Spain and the Canaries, with 86,102 tons, and Japan, with 75,863 tons, have been by far our best customers during the year.

### IMPORTS OF GAS OIL.

During November, 9,011,937 gallons of gas oil were received, as compared with 14,463,370 gallons in November, 1926. The aggregate of the gas oil imports for the eleven months was 92,102,647 gallons, compared with 105,690,150 gallons in the coal strike year.

# POTENTIAL INVESTMENTS.

## VI.—BRISTOL GAS COMPANY.

The Bristol Gas Company is one of the oldest companies in existence. The original Bristol Gas Light Company was started in 1816, and incorporated by Special Act of Parliament in 1819. The Bristol and Clifton Oil Gas Company was incorporated by Special Act of Parliament in 1823. In 1853 these two companies amalgamated under the style of the "Bristol United Gas Light Company;" the name being altered to "The Bristol Gas Company" in 1891. The statutory area of supply covers about 250 square miles, embracing the City and County of Bristol, the Urban Districts of Kingswood and Mangotsfield, and certain parishes in the Rural Districts of Chipping Sodbury, Thornbury, Warmley, Axbridge, Clutton, Keynsham, and Long Ashton. The population in the whole area is about 460,000, and the gas consumers number 89,000.

The capital of the Company as shown by the last accounts is as follows:

| | £ |
|---|---|
| General capital stock (5 p.ct. maximum, including £444,250 added on conversion in 1891) | 1,287,500 |
| Premiums | 37,619 |
| Remaining to be issued | 397,381 |
| Total amount authorized | £1,722,500 |

Under the Board of Trade Order, 1927, the Company may raise, by the creation and issue of preference shares or stock (at a rate not exceeding 6 p.ct.), any moneys which they are authorized to raise as general capital stock.

| | £ |
|---|---|
| Loan capital— | |
| Debenture stock (4 p.ct.) | 120,420 |
| New debenture stock (4 p.ct.) | 217,870 |
| Remaining to be borrowed (without Justice's certificate) | 324,269 |
| Remaining to be borrowed (with Justice's certificate) | 198,691 |
| Total amount authorized | £861,250 |

The new debenture stock ranks for both interest and capital after the debenture stock. Under the Bristol Gas Act of 1910 the Company can at any time, by agreement with the holders, redeem or purchase any of the first-mentioned debenture stock; and by the Board of Trade Order of 1927 the Company shall not, without the consent of the Board of Trade, pay interest at a higher rate than 5½ p.ct. per annum.

*Transfer Arrangements.*—Common form. Fee for registration of transfer, 2s. 6d.; death in joint holdings, power of attorney, or distringas, *nil;* probate or marriage (declaration also required), 5s. All classes of stock can be transferred on same deed (without extra fee) and in amounts and multiples of £10. Husband's witness of wife's signature, or *vice versa,* not accepted. Voting—£50 capital stock 1 vote; £100, 2; £200, 3; £300, 4; £500 and upwards, 5 votes. Director's qualification £1000; Auditors £10.

*Accounts and Dividends.*—Accounts are made up to Dec. 31 and submitted in February; an interim dividend being paid in August. Dividends are not subject to sliding-scale. The maximum price of gas is 1s. 3d. per therm, fixed by Board of Trade Order under section 1 of the Gas Regulation Act on April 20, 1922. Present price 8d. per therm; declared calorific value (since July 1, 1922) 480 B.Th.U.

The cross-page table illustrates the progress made by the Company since the year 1903. The period of the war and the few following years have been purposely ignored owing to the abnormal conditions then prevailing.

The reduced profit in the year 1926 was due to the increased cost of raw material during the coal stoppage and to the fact that no increase was made in the price of gas until the last quarter. As will be noticed, the price of gas is usually extremely low; and the present price (8d. per therm, equalling on 480 B.Th.U. 3s. 2·4d. per 1000 c.ft.) compares very favourably with the pre-war price, and must encourage sales. The increase in the gas sold since the year 1903 calculated on a volumetric basis is 73 p.ct.; last year, 1926, being a record output.

The general capital stock is quoted on the London Stock Exchange and at Bristol and Cardiff. The debenture stocks are quoted at Bristol. The following table shows the prices of the highest and lowest transactions on the capital stock (Bristol Exchange), the dividends paid, and the yield on the average price during the past four years:

| Year. | Transactions. Highest. | Transactions. Lowest. | Dividend. P Ct per Annum. | Yield P.Ct. per Annum on Average Price. |
|---|---|---|---|---|
| | | | £ s. d. | £ s. d. |
| 1923 | 99½ | 90½ | 5 0 0 | 5 5 3 |
| 1924 | 95⅞ | 89 | 5 0 0 | 5 8 3 |
| 1925 | 98 | 89 | 5 0 0 | 5 7 0 |
| 1926 | 91½ | 84½ | 5 0 0 | 5 13 7 |

To-day the average quotation at Bristol is 87½, yielding £5 14s. 3d. The stock is closely held locally and rarely appears on the market. Investors desiring to acquire a holding should place a standing order with their brokers.

| Year. | Net Gas Rental (*i.e.* after Deducting Public Lamp Charges) per 1000 C.Ft. | | Quantity Sold. Million C.Ft. | Capital Expended per 1000 C.Ft. Sold. | | Gross Profit. | Total Charge for Capital. (See Note.) | Rate of Ordinary Dividend. P.Ct. per Annum | Amount Carried Forward and Balance Reserve Fund. |
|---|---|---|---|---|---|---|---|---|---|
| | s. d. | | | s. d. | | £ | £ | £ | £ |
| 1903 | 2 2·9 | | 2,142 | 11 1 | | 86,578 | 65,635 | 5 | 137,499 |
| 1908 | 1 11·4 | | 2,473 | 11 5 | | 57,645 | 73,444 | 5 | 134,341 |
| 1913 | 1 10 3 | | 2,760 | 11 1 | | 58,039 | 76,381 | 5 | 209,090 |
| | Per Therm. d. | Per 1000 C.Ft. s. d. | Therms. | Per Therm. s. d. | Per 1000 C.Ft. s. d. | | | | |
| 1923 | 7·67 | 3 0·8 | 16,033,387 | 1 10 | 8 9 | 97,686 | 77,186 | 5 | 284,408 |
| 1924 | 7·36 | 2 11 3 | 16,777,354 | 1 9 | 8 4 | 64,053 | 77,839 | 5 | 273,761 |
| 1925 | 7·71 | 3 1·0 | 17,295,014 | 1 9 | 8 3 | 80,236 | 78,850 | 5 | 276,115 |
| 1926 | 8 12 | 3 3·0 | 17,783,918 | 1 8 | 8 2 | 39,359 | 79,723 | 5 | 235,751 |

NOTE.—Total charge for capital includes dividend and interest paid and amount (if any) carried to reserve fund.

## Removing Rust Deposits from Mains and Services.

It has been pointed out by a Committee of the Pacific Coast Gas Association that the removal of dust deposits and other materials from mains and services will be a problem whether or not dehydration of the gas is effected. Dust control is a necessary expedient where dehydration is not practised, in order to render proper service without continual complaints regarding stuck meters, pilot-light stoppages, and fouled thermostats. Where dehydration is put into effect, the drying-out of mains and services may cause dust conditions of unexpected seriousness, and methods of control are necessary. Owing to the difficulties bound to be encountered in the use of water or oil as a filtering medium, the attention of Pacific Coast gas men has centred upon the dry-type filter, using either a fine-meshed cloth or screen, or some such medium. Filters installed by many companies make use of a wire screen. This type has the disadvantage that the area for filtering purposes is necessarily limited; and it soon develops back-pressure, because of the clogging effect of the dust. Thus servicing cost is a serious handicap. A filter using a screen made of cloth has been developed by the San Diego Consolidated Gas and Electric Company. This gives a large area for filtering. However, the cloth soon deteriorates—especially when clogging of the material subjects it to a strain; and the constituents of the gas cause the cloth to rot. Perhaps the most successful filter of this type is one devised to use curled hair as a medium. This material offers a great amount of surface exposure with least resistance to gas flow. When the hair is oiled, it will filter-out the finest particles of dust encountered.

## The Grit Nuisance.

Gas engineers using water-gas plants have experienced the trouble due to "fliers" or "grits" emitted from the stacks of these plants being deposited on their roofs and machinery. Where dwelling-houses are near to gas-works, complaints from the public have also been a source of worry. For many years efforts have been made to overcome this nuisance, and different types of dry and wet catchers tried. It is worthy of notice that so successful has been Parker's patent "Centriflovane" grit catcher in dealing with this problem that 80 have been installed during the year; and altogether 120 have been ordered. While retaining simplicity of design, the patent "Centriflovane" (made by the Tipton Tub & Tube Co., Ltd., of Tipton) incorporates the natural laws governing the problem. No water is used; and, as it is automatic, there are no running expenses.

# THE COOKERY AND FOOD EXHIBITION.

## A REVIEW AND AN APPRECIATION.

By JOSEPH ODONE.

In reviewing the recent Cookery and Food Exhibition at the Holland Park Hall, one must undoubtedly agree that from every point of view it surpassed any exhibition previously organized by the Universal Cookery and Food Association. It is a generally accepted fact—for reasons which it is difficult to explain—that to attract the general public to Holland Park is a much harder task than to Olympia; but despite this fact, and the added handicaps of fog of the blackest and most dismal nature, followed by a torrential downpour lasting over several days, a larger and more representative number of the actual public visited the exhibition than in any previous year.

The outstanding feature was unquestionably the Culinary Group, where the exhibits were of such a nature that they literally made the novice gasp with amazement at their exquisite artistry and novelty. Even the most hardened in the Catering Trade were astounded at the exhibits displayed; and what perhaps was the most pleasing feature was the fact that the results attained were to a large measure due to the enthusiasm and interest shown by the chefs and cooks from all parts of Europe, resulting in a truly international display, such as had never been witnessed in London previously.

The same applies to the Demonstration Theatres, where almost continuous displays were taking place, from Army and Navy competitions to those for Girl Guides, Empire cooking, and demonstrations of cookery from all over Europe (showing the respective national dishes and a hundred-and-one others). The daily attendance at all of these illustrated beyond question the eagerness existing in the mind of the average housewife of to-day to acquire expert knowledge and assistance for the betterment of her own home. In the Domestic Section all records were broken as far as entries were concerned; and one could not help feeling that the quality of the exhibits more than justified the educational side of the work of the Association, because it proved that such work was bearing good fruit.

The attainment of results such as these must of necessity entail a vast amount of preparation and advance work on the part of the officials and numerous Committees; but it will be agreed that work of this nature will come to naught, unless the controlling head be a man of tact, patience, and industry. An Association such as this, too, with its international interests, requires a man with a real knowledge and understanding of the idiosyncrasies of human nature to ensure keeping everyone together, so as to maintain a feeling of good fellowship and loyalty to the common cause. For these reasons alone—apart from his organizing abilities—no one could be better suited than Mr. J. E. Henwood to fill the office of Chairman of the Association.

In my many years of association with Mr. Henwood, I never recollect his losing his temper or letting anyone else's temper upset him. I have seen many instances in which irate officials, having their own personal grievances, have poured out a tale of woe and complaint, only to be met with a pair of twinkling eyes, a humorous smile, and a word of real encouragement, which have immediately disarmed them and dissolved their anger, leaving them keener than ever to extend whole-hearted co-operation to one whose charm of manner compels a man to offer of his best.

Anyone working under Mr. Henwood as I have done for the past year would recognize that here is a man who, despite the many calls which his business necessarily makes upon him, is not seeking for any personal aggrandisement or publicity, but is simply actuated by a sincere belief in the efforts of the Association to improve the standard of cooking in this country, and to provide educational means by which everyone, from the professional cook down to the humble cottager, can gain infinite benefit.

Furthermore, if you suggest to him that the success obtained is in any way the result of his own personal efforts, he will strenuously deny any such suggestion, and assure you that it has been entirely due to the unstinted support that he has received from everybody concerned. If you question him as to his career, he will tell you that any success he has met with has been due to his good fortune in being associated with a Management who are never satsfied unless they are keeping pace with the times; and in his service with the Gas Light and Coke Company he has never seen this policy varied—certainly during the last 25 years.

Mr. J. E. HENWOOD,

Chairman of the Universal Cookery and Food Association.

Mr. Henwood is a keen Mason, and at present is Master of his Lodge (St. Martin's No. 2455). He is also a Vice-President of the United Wards Club of the City of London.

## A New Gas Boiler.

Messrs. Lumbys, Ltd., of Halifax, have put on the market a gas boiler which is particularly suitable for caterers' work. It is self-feeding; and a supply of boiling water is ready in eight minutes after lighting. One of the novel features of the boiler, which is called the "Ufix," is that the interior is removable and interchangeable. Consequently, when the appliance becomes furred-up, a spare interior takes the place of the one which is being cleaned. The construction is simple; and the materials of which it is made—pure tin and best copper sheets—are robust. The shape of the interior, being of the **V** type, and widest at the top, allows of easy and efficient cleaning. Its design permits of nothing but boiling water being drawn from the customary tap; but hot water can, if desired, be drawn from a lower tap. The combination gas control taps are made of gunmetal, and can be taken out along with the burner in a moment by removing four screws.

**Development of the Gas Turbine.**—Prof. G. F. Charnock, lately retired head of the Engineering Department of the Bradford Technical College, lecturing on the gas turbine to the Bradford Engineering Foremen's Mutual Benefit Society, said that if the internal combustion engine was to compete with the steam turbine, the reciprocating type of engine hitherto universally adopted for gas and oil must be abandoned. There was no longer any room to doubt that the gas turbine as a commercial proposition would ultimately become an accomplished fact. The two main difficulties were the limitations of the working temperature imposed by the materials used, and the inefficiency of the rotary compressor. There were signs that the former difficulty had been practically surmounted by recent research at Sheffield; and as soon as a satisfactory compressor should be devised, it should be possible to produce a gas turbine having a higher over-all efficiency than any existing prime mover.

**Carbonate of Lime.**—In a note published by the "Yorkshire Post," from their Middlesbrough correspondent, he made the remark that carbonate of lime from Billingham is of very little value, except for the purpose of manufacturing cement. Sir Frederick Keable, Director of Agricultural Research for Nitram Limited, referring to this statement writes to our Yorkshire contemporary as follows: "The bye-product calcium carbonate produced at Billingham is of the greatest possible agricultural value. It consists of calcium carbonate in an extremely fine state of division; and consequently when spread on the land comes into immediate action both by way of reducing soil acidity and as a plant food. I may add that, in order to secure the use of Billingham carbonate for agricultural purposes, the price at which it is being sold at the works is no more than 7s. per ton, and that this material, although not in a dry enough state to admit of distributing on the land by a fertilizer distributor, contains an amount of sulphate of ammonia which in itself is worth 3s. 4d. per ton."

# LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

## Possibilities of Gas for the Frying of Fish and Potatoes.

A Meeting of the Association took place at the Westminster Technical Institute on Friday, Dec. 16—Mr. LEONARD LACEY, B.Sc., the President, in the chair.

### GAS-FIRED FISH-FRYING RANGES.

By J. M. LOUGHLAND, of the Gas Light and Coke Company.

[EXTRACT.]

When your President asked me to read a paper to the Association, I had recently been instructed by my Company, the Gas Light and Coke Company, to deal with the application of gas in the fried fish and chip trade in their eastern area. Having gone thoroughly into the process of frying fish and chips by gaseous fuel, I thought a paper on this subject would be of interest to you. Estimates have been made of the number of shops carrying on this trade in the country; and it has been put as high as 50,000 for Great Britain and 5000 for Greater London. I have ascertained the number within the area for which I am responsible, and find that there are 230 shops. Of this number, only 30 are using gaseous fuel; the rest employing hard fuel. The average consumption of the shops using gas is approximately 400,000 c.ft. per annum each, so that if we were successful in persuading the whole of these tradesmen to instal gas instead of hard fuel, the additional consumption would be 92 million c.ft. per annum. The consumption would help to level up our load—the ideal of every gas engineer. The demand for gas in any of these shops would rarely exceed 1000 c.ft. per hour per shop, which should not seriously affect any distribution system.

The reason for the small number of shops in the Company's eastern area employing gas was then explained by the author. There is, he said, an old part of our district where one finds a fish shop at nearly every street corner, each doing a small trade at low prices, due to keen competition; and so there is no margin of profit to pay for the slightest increase in the cost of fuel, for the installation of a gas range, or for the conversion of their own range to gas. In the new districts, in scheduled town-planning schemes a licence is required from the local authority before a fried fish shop may be opened; and as this trade is included in the Offensive Trades Act, the number of such shops is limited. This protects the shopkeeper and more or less eliminates competition. In such cases it is not difficult to persuade the shopkeeper to instal gas; and we have quite recently fitted-up eight such shops with complete all-gas installations. In some provincial towns, the local authority, when issuing a licence, stipulates that a gas range must be installed—and rightly so, when one compares the hygienic condition of the shop using gaseous fuel with that using hard fuel. Unfortunately no such rule exists in any of the twelve councils controlling our eastern area.

Our Furnace Department successfully applied gas for fish frying many years ago. In all these instances hard-fuel ranges were remodelled for gas firing, and multi-headed burners were fitted to ensure an even distribution of heat over the bottom of the pan. This system gave good results, and many of these converted ranges are in use on our district to-day. One of these consumers using a converted range assured me that he had the best range in London.

We decided, however, always to press for the installation of a new gas range, rather than for the conversion of the hard-fuel range to gas. Experiments were continued by our Furnace Department; and many systems were tried out and dropped until the system shown in fig. 1 was produced. Ranges constructed for gas with this system of firing are in use on our district, and are giving excellent results. The burner is of the box slot type and is fixed in the centre of the furnace; the secondary air is conveyed through ports in the enclosure plate beneath it; and a combustion chamber of firebrick is constructed round the pan. The flame, when the burner is full on, spreads, and covers a large proportion of the bottom of the pan; and the products of combustion are drawn to the front of the combustion chamber and down through channels at either side of the burner to the back of the furnace and thence into the flue. After the burner has been full on for a short period, the tiles over the channels get very hot, and radiant heat is directed to the outer sides of the pan, with the result that the temperature is even over the whole of its surface, despite the fact that the burner actually covers only a proportion of the area. For fast trade or continuous use, this range gives fine results; but for a slow trade, when the burner has to be turned down for stand-by periods, the heat is only directed to the centre of the pan, which is not desirable.

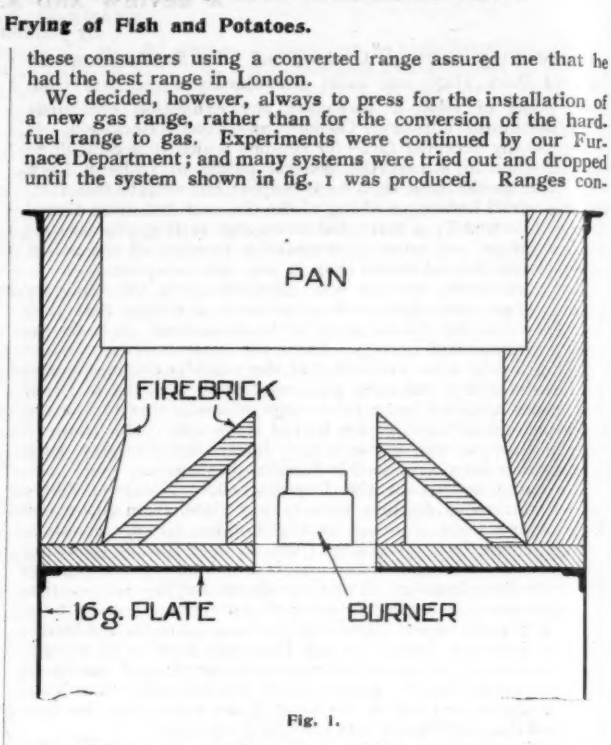


Fig. 1.

### CONSTRUCTION OF FISH-FRYING RANGES.

Much has been said of the thermal efficiency claimed for the different ranges on the market; and details regarding the working efficiency of some of this apparatus are shown in Table I.

TABLE I.

| Type | A. | B. | C. | D. | E. | F. | G. |
|---|---|---|---|---|---|---|---|
| Number of pans | Single | Twin | Twin | Twin | Single | Twin | Single |
| Size of pan | 18 in. by 18 in. by 7 in. | 27 in. by 21 in. by 8 in. | 24 in. by 24 in. by 7 in. | 23½ in. by 23½ in. by 8 in. | 22 in. by 21 in. by 7 in. | 22 in. by 16 in. by 7 in. | 20 in. by 20 in. by 7 in. |
| Type of burner | Cast-iron, slit mouth furnace | Furnace | Cast-iron with cast-iron bar stds. | Copper pans, cast-iron rings | Davis | Bar cluster | Davis |
| Number of burners | 5 | 2 | 3 each pan | 4 each pan | 1 | 3 | 2 |
| Distance of burner from pan | 4 in. | 4½ in. | 2 in. | 4 in. | 4 in. | 3½ in. | 6 in. |
| Type of lining | Firebrick | 2 in. asbestos | *Nil* | *Nil* | Firebrick | *Nil* | *Nil* |
| Size of flue | 4 in. diameter | 17 in. by 5½ in. | 5½ in. by 1½ in. | 9 in. by 2 in. | 6 in. diameter | 9½ in. by 1½ in. | 5 in. diameter |
| Width of range | 2 ft. 3½ in. | 6 ft. 7 in. | .. | 5 ft. 1½ in. | 2 ft. 11 in. | 6 ft. 8 in. | 2 ft. 6 in. |
| Depth of range | 2 ft. 3½ in. | 2 ft. 6 in. | .. | 2 ft. 9 in. | 2 ft. 8 in. | 3 ft. 4 in. | 2 ft. 6 in. |
| Amount of oil in pan, galls. | 3 at 65° Fahr. | 5 at 68° Fahr. | 5 at 70° Fahr. | 5 at 70° Fahr. | 4½ at 70° Fahr. | 4 at 58° Fahr. | 4½ at 56° Fahr. |
| Time and gas cons. to reach 360° Fahr. | 10½ min., 30 c.ft. | 15 min., 50 c.ft. | 22½ min., 39 c.ft. | 22 min., 57 c.ft. | 16 min., 40½ c.ft. | 13¾ min., 38 c.ft. | 13 min., 46 c.ft. |
| Time and gas cons. to cook 6 lbs. chips | 6½ min., 18½ c.ft. | 6½ min., 21½ c.ft. | 10½ min., 18¾ c.ft. | 17 min., 44 c.ft. | 9 min., 23 c.ft. | 6½ min., 17½ c.ft. | 6½ min., 24 c.ft. |
| Time to reach 360° Fahr. for second cook | *Nil.* Ready | 2 min. | 1 min. | .. | 1½ min. | 1 min. | ½ min. |
| Time and cons. to cook second 6 lbs. chips | 6½ min., 18½ c.ft | 6½ min., 21½ c.ft. | 10½ min., 18¾ c.ft | .. | 8½ min., 22¾ c.ft. | 5 1/5 min., 14½ c.ft. (only 4 lbs. chips) | 3½ min., 12 c.ft. (only 4 lbs. chips |
| Hourly gas cons., c.ft. | 174 | 200 | 105 | 155 | 153 | 166 | 211 |
| Gas pressure | 50/10ths | 50/10ths | 50/10ths | 50/10ths | 50/10ths | 50/10ths | 50/10ths |
| Efficiency. Water test, p.ct. | 36·5 | 32·8 | 36 9 | .. | 34·1 | 32·9 | 28·1 |
| Flue gas temp., ° Fahr. | 550 | 390 | 294 | 545 | 295 | 215 | 645 |
| Food cooked per therm | 4·6 stones | 3·97 stones | 4·57 stones | 1·95 stones | 3·72 stones | 3·26 stones | 2·39 stones |

Remarks: A—No steam; box heat contact above oil line. B—Good range. Suitable for fast trade. C—Well-constructed furnace. Too slow for fast trade. D—Not suitable for fish-frying trade. E—Suitable for fast trade. F—Suitable for ordinary trade. G—Only suitable for canteen requirements.

You will notice the original low efficiency of the last range in the table, and the increase obtained after insulating materials had been fixed to conserve the heat generated under the pan.

There are some fine gas-fired ranges on the market to-day, so far as general construction and utility are concerned; but there is a tendency to overlook the importance of the heating arrangement. In many cases no attempt is made to conserve heat by using any refractory or insulating material in the construction of the combustion chamber. The bottoms of the pans are exposed to the cooling effect of cold air coming in through the open door of the shop, which reduces the efficiency of the apparatus. I would suggest to manufacturers that the burner should be protected, if only with sheet iron with an aperture large enough to allow just sufficient secondary air to pass to the burner to support combustion of the gas.

There is another point in connection with this. If surplus air is not allowed to pass over the bottom of the pan to the flue, the latter will retain a greater capacity for the removal of the products of combustion and steam. As a striking example of this, I would mention that there are two shops using gas-fired ranges on my district in both of which the pan nearest the door is very slow compared with the others, and the burners also have a tendency to smother. I was informed by the range maker that it was of no importance how much air reached the bottom of the pan. He also informed me that it was the policy of all the range makers in the country to cut-out brickwork entirely in the construction of the gas-fired fish-frying ranges. If that is so, it remains to be proved whether this policy is a correct one. I know it is the desire to construct a range that will cool down immediately the gas is turned off, in order to prevent the evaporation of fat or oil after frying is done; but this can be safely left in the hands of the fish fryer, who can easily cool-down his pans by putting in a batch of chips and partly cooking them, which is very often done. I would suggest that the evaporation of fat, even with a hard-fuel furnace, does not take place so much after frying is done, but rather during the stand-by period when the fire is kept ready for the trade.

I have never found it bad practice to endeavour to cut down consumption by the control of secondary air and the introduction of refractory and insulating materials to obviate heat losses, or at least to reduce them to the lowest possible degree. I certainly think that we can prevent some of the loss through the combustion chamber into the flue, by controlling the secondary air to the burner, and also by introducing refractory and insulating material in the construction of the furnace. Experiments are being carried out on these lines; and I feel sure that we shall get some better results.

### VENTILATION.

A fried fish shop is rarely built specially for that trade. Any old shop, with a flue good, bad, or indifferent, is accepted. The flue is the most important part of a gas-fired fish-frying range, and it may determine whether the range is a success or a failure; for not only has it to deal with the products of combustion, but it has to take the steam from the pans—a fluctuating quantity—which may seriously affect combustion. For instance, with a sluggish flue, when a batch of chips is placed in the pan and the steam box is closed, steam is generated so rapidly that slight pressure may occur in the steam

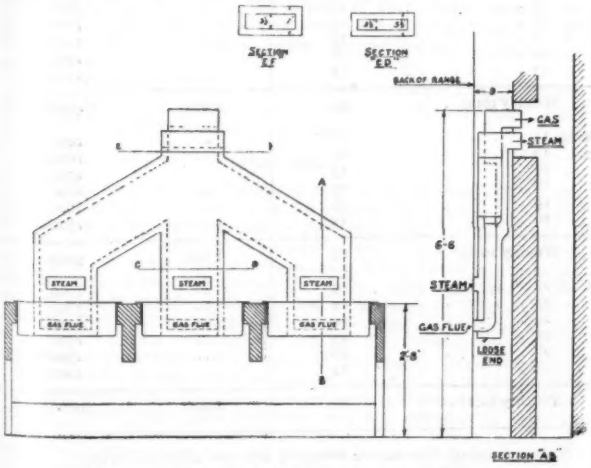


Fig. 2.

box, condensing chamber, and flue. This will cut off the outlet for the products of combustion, and cause the burner to smother until the volume of steam is reduced and space in the flue is available for the products of combustion to get away. Combustion may also be affected if the steam box is open and the pull on the combustion chamber is thereby reduced. Fig. 2 shows a method of dealing with the steam and flue gases in such a way that the above-mentioned defects are overcome. With this system it would be safe to connect a three-pan range into a narrow flue without any risk of bad ventilation. On the other hand, we may have a very tall chimney of large flue area with a terrific pull. In that case the bottom of the flue outlet from the combustion chamber should be left open, which would break down this pull and so remedy that defect.

With all gas apparatus the question of ventilation is most important, and very often the efficiency may be increased by simply breaking the flue and thereby stopping any undue or excessive pull on the furnace or combustion chamber.

A gas-fired fish-frying range should be self-ventilating and the flue outlet from the apparatus should have an open end at the back of the flue outlet of the combustion chamber, so that there is no direct pull. I would also suggest that the products of combustion and steam should, as far as possible, be kept in separate channels before they enter the common flue, and thus obviate the possibility of one affecting the other. The cost of the installation would be increased, but the better results obtained would, I consider, warrant the additional expenditure.

### IMPROVEMENT IN THE APPLICATION OF GAS FOR THIS PROCESS.

It is gradually being realized that gas is the ideal fuel for the process of fish and chip frying; and much progress has been made in the method of application. The Davis Furnace Company, who have been experimenting with gas for the process for many years, have now invented a new system which goes further than any previously produced in meeting the requirements of fish and chip fryers. Distribution of heat, easy and perfect adjustment, simplicity of control, and the absence of any projecting taps are all features of this burner, which will assist in making gas the most reliable and efficient fuel for the trade. The burner is illustrated in fig. 3; and the excellent control arrangement is shown in fig. 4.

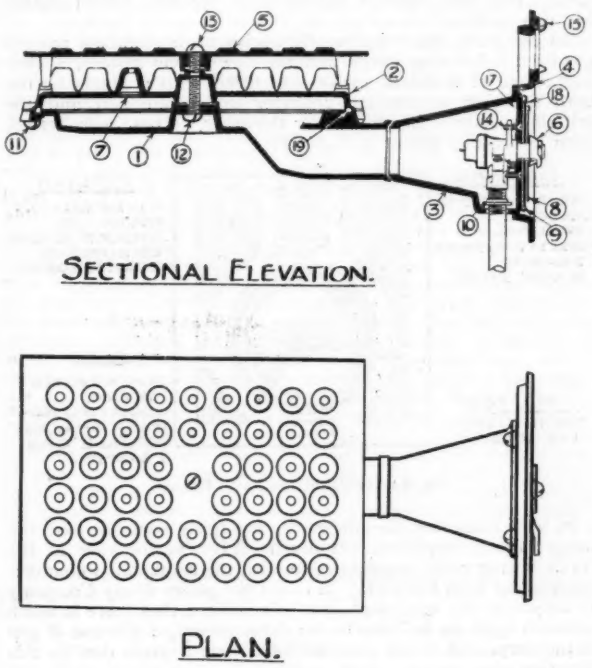


Fig. 3.—The New Davis Fish-Frying Burner.

**Specification of Complete Davis Burner.**

| Part No. | Name of Part. | Material. |
|---|---|---|
| 1 | Burner body (mixing tube) | C.I. |
| 2 | Burner top | C.I. |
| 3 | Venturi cone | C.I. |
| 4 | Front with lighting door | C.I. |
| 5 | Intensifying plate | C.I. |
| 6 | Gas cock (complete with handle) | Brass |
| 7 | Atomizer ring | Brass or fireclay |
| 8 | Main air shutter (moving) | Brass |
| 9 | Auxiliary air shutter (semi-fixed) | ,, |
| 10 | ,, ,, disc. (moving) | ,, |
| 11 | ⅛ in. rd. hd. screws by ⅜ in. long (Whit.) | Steel |
| 12 | ¼ ,, ,, ,, ,, 1⅜ ,, ,, | ,, |
| 13 | ¼ ,, ,, ,, ,, 1 ,, ,, | ,, |
| 14 | ¼ in. by ⅛ in. ctsk. screws (Whit.) | ,, |
| 15 | ⅛ in. by ⅛ in. rd. hd. ,, ,, | ,, |
| 16 | ⅛ in. by ⅛ in. grub screw ,, | ,, |
| 17 | ⅛ in. by ⅛ in. rd. hd. screws (Whit.) (⅜ in. for 200 burner) | ,, |
| 18 | Special ⅛ in. brass screw | Brass |
| 19 | Asbestos string | — |

We recently fitted Davis burners to a three-pan gas range that was not giving satisfaction, owing to the fact that it was not fast enough for the trade that had developed in the shop

TABLE II.—*Comparison of Bar Burners with Davis Burner.*
Tests Made with 60 Lbs. of Water in Pan 3 Ft. by 3 Ft.

| Initial Temperature, ° Fahr. | Final Temperature, ° Fahr. | Temperature Rise, ° Fahr. | Time Taken, Mins. | Gas Pressure. | Gas Rate. | | Gas Consumption. | | Efficiency, P.Ct. | Time Elapsed Between Tests. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | C.Ft. per Hour. | Therms per Hour. | C.Ft. | B.Th.U. | | |
| **FOUR BAR BURNERS.** | | | | | | | | | | |
| 52 | 194 | 142 | 17 | 30/10 | 160 | 0·8 | 45·3 | 22,650 | 37·6 | starting from cold |
| 52 | 200 | 148 | 16 | 30/10 | 168 | 0·84 | 45·0 | 22,500 | 39·5 | 5 mins. |
| 52 | 200 | 148 | 15 | 35/10 | 180 | 0·9 | 45·0 | 22,500 | 39·5 | 11½ ,, |
| 52 | 200 | 148 | 13 | 40/10 | 204 | 1·02 | 44·3 | 22,150 | 40·1 | 21½ ,, |
| **DAVIS BURNER WITH FIREBRICK.** | | | | | | | | | | |
| 52 | 200 | 148 | 14·5 | 30/10 | 160 | 0·8 | 40·0 | 20,000 | 44·4 | starting from cold |
| 52 | 200 | 148 | 11 | 35/10 | 188 | 0·94 | 34·5 | 17,250 | 51·1 | 9 mins. |
| 52 | 200 | 148 | 11 | 40/10 | 191 | 0·96 | 35·0 | 17,500 | 50·7 | 14 ,, |
| 52 | 200 | 148 | 11 | 40/10 | 191 | 0·96 | 35·5 | 17,750 | 50·0 | 24 ,, |

in which it was fixed. The original burners supplied were removed, the combustion chambers remodelled, and the Davis No. 200 burner was fixed, with the result that the output has been nearly doubled, with an increased consumption of only 30 p.ct. Needless to say, our consumer is very pleased with the result, and he has increased his trade very considerably since this alteration was carried out. Two potential consumers were subsequently taken to see this installation; and each has ordered a three-pan range fitted with the new Davis burner. This proves that the satisfied consumer is the best advertisement one can have.

To ascertain the relative efficiencies of a standard pattern gas-fired fish-frying range and the new Davis system, a two-pan range of standard make was fitted with a Davis burner with firebrick combustion chamber under one pan and the original system of heating under the other. These were tested, with the results shown in Table II.

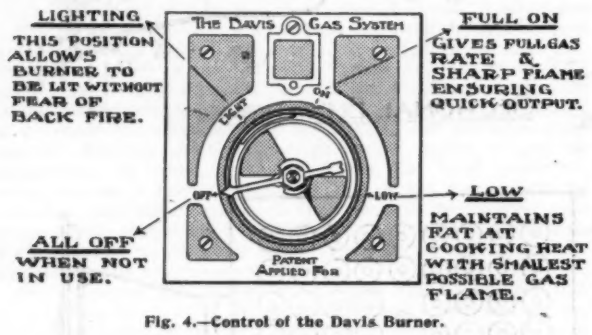
LIGHTING
THIS POSITION ALLOWS BURNER TO BE LIT WITHOUT FEAR OF BACK FIRE.
THE DAVIS GAS SYSTEM
FULL ON
GIVES FULL GAS RATE & SHARP FLAME ENSURING QUICK OUTPUT.
LOW
MAINTAINS FAT AT COOKING HEAT WITH SMALLEST POSSIBLE GAS FLAME.
ALL OFF
WHEN NOT IN USE.
PATENT APPLIED FOR

**Fig. 4.—Control of the Davis Burner.**

In both instances the efficiencies are fairly constant over the range of consumptions, but much higher in the case of the Davis burner used in conjunction with the combustion chamber constructed with firebrick. It is not the policy of my Company to construct any apparatus, but it is realized that there is much research work to be done in the development of the use of gas in industry, and in the past we have done a great deal in this direction.

The conversion of the hard-fuel range is not usually to be recommended. However, if there is a case where you are compelled to convert a hard-fuel range, the Davis burner can be fitted with good results, providing the flue has been tested and found to be satisfactory.

The following data regarding flue areas and sizes of burner will be found useful.

*Gas Rate.*—Calculate area of pan bottom and allow 180 B.Th.U. per sq. in. per hour, or 0·36 c.ft. of 500 B.Th.U. gas.
*Flue Area.*—Allow 15 sq. in. of flue area (above bottom of pan) per 100 c.ft. of gas per hour.

Table III. gives a schedule of pan sizes, pan areas, requisite gas consumptions, and burner equipment.

### FUEL COSTS.

The vital point with fish fryers is fuel cost; and for this reason I would recommend that we should concentrate our efforts towards increasing the efficiency of the gas-fired fish-frying range, rather than attempting to increase the possible saving of oil through evaporation. This, after all, is only a side issue.

I have read of many systems of arriving at the fuel costs of this trade, and have come to the conclusion that a record of at least a week's working should be taken when making calculations, because, in many instances, most of the business is done on Friday and Saturday, when the stand-by period is

TABLE III.

| Size of Pans. | | Area in Sq. In. | Gas Consumption per Hour at 0·36 C.Ft. per Sq. In. | Burner Equipment. |
|---|---|---|---|---|
| Wide. | Long. | | | |
| In. | In. | | | |
| 14 | 16 | 224 | 80·64 | 100 |
| 14 | 20 | 280 | 100·80 | 100 |
| 14 | 23 | 322 | 115·92 | 100 or 150 |
| 14½ | 14½ | 210·25 | 75·69 | 100 |
| 14½ | 17½ | 253·75 | 91·35 | 100 |
| 16 | 22 | 352 | 126·72 | 150 |
| 17½ | 27 | 472·5 | 170·10 | 200 |
| 18 | 18 | 324 | 116·64 | 100 or 150 |
| 18 | 24 | 432 | 155·52 | 150 |
| 18 | 28 | 504 | 181·44 | 200 |
| 19 | 23 | 437 | 157·32 | 150 |
| 20 | 30 | 600 | 216·0 | 200 |
| 21 | 21 | 441 | 158·76 | 150 |
| 21 | 24 | 504 | 181·44 | 200 |
| 21 | 27 | 567 | 204·12 | 200 |
| 21 | 30 | 630 | 226·80 | 250 |
| 22 | 22 | 484 | 174·24 | 200 |
| 22 | 23 | 506 | 182·16 | 200 |
| 23 | 24 | 552 | 198·72 | 200 |
| 24 | 30 | 720 | 259·20 | 250 |

at a minimum and the fuel cost very low per stone of food cooked, compared with (say) Monday or Tuesday.

The following is a record of food cooked and consumption of gas on a three-pan range, each pan, 24 in. by 24 in., being fitted with the No. 200 new Davis gas burner.

| Date. | Fish Cooked. | Potatoes. | Gas Used. |
|---|---|---|---|
| | Stones. | | C.Ft. |
| Aug. 8 | 15 | .. | 1400 |
| ,, 9 | 15 | .. | 1600 |
| ,, 10 | 14 | .. | 1200 |
| ,, 11 | 15 | .. | 1600 |
| ,, 12 | 16 | .. | 1700 |
| ,, 13 | 16 | .. | 1700 |
| **Weekly total** | 91 | 1 ton | 9200 |
| Aug. 15 | 14 | .. | 1400 |
| ,, 16 | 14 | .. | 1600 |
| ,, 17 | 13 | .. | 1500 |
| ,, 18 | 15 | .. | 1200 |
| ,, 19 | 16 | .. | 1800 |
| ,, 20 | 12 | .. | 1500 |
| **Weekly total** | 84 | 1 ton | 9000 |
| Aug. 22 | 13 | .. | 1400 |
| ,, 23 | 14 | .. | 1500 |
| ,, 24 | 14 | .. | 1400 |
| ,, 25 | 15 | .. | 1700 |
| ,, 26 | 16 | .. | 1500 |
| ,, 27 | 12 | .. | 1600 |
| **Weekly total** | 84 | 1 ton | 9100 |

Summarizing the above results, we get the following:
739 stones of fish and potatoes cooked with 27,300 c.ft. of gas.
Consumption per stone—37 c.ft. of gas, including heating-up and all stand-by losses.
Calorific value of gas used—450 B.Th.U. per c.ft., representing a consumption of 16,650 B.Th.U. per stone.
One therm of gas is, therefore, capable of cooking 6 stones of food, which I take as the basis of the diagram showing cost of cooking per stone, with gas at various prices per therm (fig. 5).
This result has been confirmed by tests taken on other ranges fitted with the Davis burner, and the graph has been drawn up

to enable the cost of cooking per stone, in pence, readily to be calculated, if the price per therm is known.

### FIXING.

Unfortunately, the work connected with the fitting of these shops is usually carried out by a jobbing builder who, in most cases, has no knowledge of the process or the ventilation required. The range is then fixed and the gas company may be called in to run the gas supply. I have found cases where jobs have not been dealt with properly—such, for instance, as only a 10-light meter fitted, and a 1-in. supply pipe run to a three-pan range, which, you will agree, is far from satisfactory. In no instance should the service pipe be less than 2 in., and care should be taken that a meter of sufficient capacity to supply the apparatus is installed.

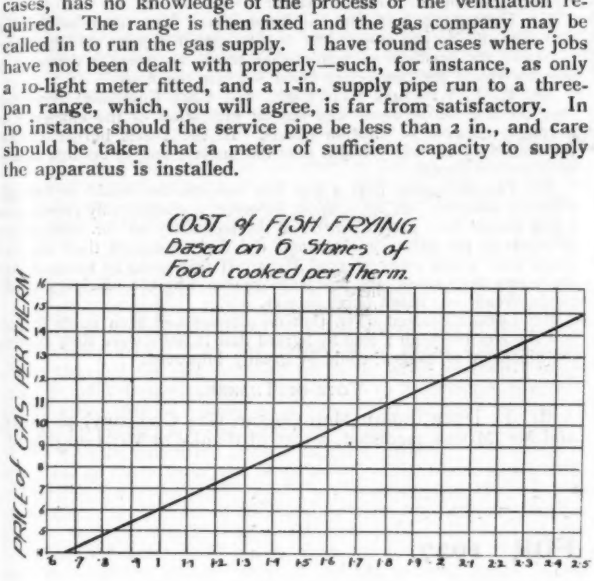


**Fig. 5.**

Before the high-capacity meter was available, it was frequently a difficult problem to find a position for the meter; but that difficulty has now been surmounted, as it is possible to obtain a 30-light size meter with a capacity of 700 c.ft. per hour.

In conclusion I would refer to the paper read to the Midland Junior Gas Association on Dec. 15, 1921, by Dr. E. W. Smith, when he emphasized the necessity for the standardization of general practice regarding the sale of gas for industrial purposes. In no industry is this so necessary as in the fried fish trade, for these tradesmen are continually migrating from town to town throughout the country. Recently I have been dealing with consumers who have come from Southampton, Ware, Ipswich, and Cardiff, and in all these instances, I am given to understand, different rates of discount were given. It is difficult to explain why this variation in charges should exist.

In his paper Dr. Smith inquired "Has sufficient been done to encourage the industrial load?" I might easily ask "Has sufficient been done to secure the fish and chip frying load?" The prize is a good one. 1000 million c.ft. per annum is the estimated consumption for the whole of this trade throughout the country. No prize was ever won without hard work; and there is still some to be done before we secure this business for our industry.

I am greatly indebted to the Davis Furnace Company for allowing Mr. Twigg to give me useful data, drawings, &c., which I have made use of in this paper.

### Discussion.

The CHAIRMAN, having remarked that they had listened to the paper with great interest—it was, of course, of particular interest to those connected with the sale of gas—expressed his surprise that only 30 out of 230 fish-frying establishments in the area for which the author was responsible used gas as a fuel. Could Mr. Loughland tell them what was the nature of the solid fuel used in the remainder—how much coal and how much coke? The author's statement that the fish-frying load helped to level-up the daily output of gas was of great importance: and for that reason alone it was most desirable to foster this aspect of gas sales. From what the author had said, it appeared that the gas industry was in this respect faced with psychological rather than scientific problems. Even when they had efficient gas appliances, they still had difficulty in front of them. The fish-frying business was often started in a very small way, and when it was urged that the proprietors of the small establishments should instal gas ranges, the question of capital cost became of importance. Then there was the hygienic aspect to take into consideration; and the conditions in some establishments were anything but pleasant. Local authorities were interesting themselves in this, and perhaps regulations would come into force which would help the gas industry. The burner which the author had specially mentioned (this was exhibited at the meeting) seemed to meet the case for gas very well.

Mr. LOUGHLAND, replying to the Chairman's remarks about solid fuel, said that there was now on the market a beautifully constructed coal-fired range. There was a three-pan range with the outside furnaces fired by hand fuel, and the centre one fired by gas. The range had a fairly high efficiency, and the difference in cost between coal and gas worked out at about three to one in favour of coal. As Mr. Lacey had said, the burner exhibited was a good one, but they might improve upon it.

Mr. D. J. WINSLOW (Lea Bridge) said that three or four years ago he had to deal with a case where a fish fryer had been persuaded to change from coal to gas, but who found that gas was not capable of coping with rushes of work. Three Davis burners were thereupon fitted—not like the one which the author had shown, but bar burners—to each pan; and the arrangement proved most satisfactory. This particular fryer had need of a fierce burner; and he (Mr. Winslow) wondered whether the burner shown by Mr. Loughland was sufficiently fierce. The consumption in the instance mentioned was about 100,000 c.ft. a month.

Mr. W. R. MOGER (Tottenham) asked Mr. Loughland whether he had any experience of the grid burner and of the condensation apparatus. He (the speaker) found that the former worked very well.

Mr. LOUGHLAND said that the grid burner was good. As a matter of fact, he did not suppose there was a difference greater than about 1 p.ct. between all the various burners; but the grid burner could not be controlled with the same facility as could the Davis burner exhibited. Most fish fryers had a two hours' rush trade at midday, and a further rush period at night, chiefly between nine and ten o'clock. For this work they needed a burner which would cope with a heavy demand. It was possible to pass 250 c.ft. of gas an hour through the burner shown.

### HIRE-PURCHASE OF FISH-FRYING RANGES.

Mr. W. T. KENSHOLE (Lea Bridge) observed how valuable the information contained in the paper would be to those who came into contact with fish fryers. He would like to ask the author whether, when coal was used, soot was deposited on the sides and bottom of the pan. Also, what was the usual distance between the pan and the Davis burner, and between the pan and the grid burner? Could Mr. Loughland give them any information regarding the life of the pans when gas was used and when coal or coke was employed? Had a system of hire-purchase been adopted for the gas-fired ranges in Mr. Loughland's area of supply? As the installation of a gas range implied such a big consumption of gas, he thought the possibilities of the hire-purchase system should be investigated.

Mr. LOUGHLAND said that the fireboxes of the modern coal-fired ranges were well constructed, and he knew of no cases where there was any detrimental effect due to accumulation of soot on the sides and bottom of the pan. The general practice adopted by fish fryers was to place the "crackling," as it was called, in a box; and when the rush period approached, some of this "crackling" was added to the fire. The flames rapidly consumed any soot there might be on the bottom of the pan. The Davis burner had to be fitted 2½ in. from the bottom of the pan. This distance had been determined by the makers of the burner after years of experiment. With regard to the life of the pan, he knew of no case where a pan had been badly affected by gas, except when a box slot type of burner was employed which drew the bottom of the pan down. He thought the wear and tear on the pan must be greater when hard fuel was employed. With gas, the heat was well distributed. In his area of supply they had no hard-and-fast rule about hire-purchase; but if they came across a consumer who was willing to instal a gas range, and who could not pay outright for it, they endeavoured to come to a mutually convenient arrangement. To his mind, hire-purchase of gas ranges would have to be adopted eventually. He had hoped that the question of discount would have been raised. He thought that discounts should be standardized throughout the industry. It was difficult when a man came from a district where a large discount was given to a district where the discount was comparatively small.

### THE QUESTION OF DISCOUNTS.

Mr. WINSLOW asked whether Mr. Loughland advocated the giving of discounts to fish fryers. To his (the speaker's) mind, this should be done. They were really industrial users of gas.

Mr. LOUGHLAND agreed that discounts should be allowed.

Mr. W. L. WESTBROOK (North Middlesex) observed that discounts were given in his area of supply. Above certain consumptions, 10 p.ct. was allowed, irrespective of the use to which gas was put.

Mr. LOUGHLAND remarked that it was not the general practice in the London area to allow fish fryers discounts.

Mr. MOGER said that in his district they allowed discount, but the consumption must reach 50,000 c.ft. per quarter.

Mr. WINSLOW remarked that in the North of England discounts were given, while, generally speaking, they were not allowed in the South. There ought to be standardization, as suggested.

### DEALING WITH THE PRODUCTS OF COMBUSTION.

Mr. WESTBROOK said that the question of steam cutting off the products of combustion from the flue, and causing smothering, was most important. Did the Davis burner which was exhibited smother? Would it not be possible to arrange separate flues from the pans—one for steam and one for the products of combustion? He had installed a three-pan range, and had arranged a sealed chamber at the end of the combustion chamber. The air in this sealed box, on being heated, expanded; and when the outlet was opened the pressure was sufficient to circulate this air round the box. As a matter of fact, this big range was not functioning as he would like it to operate, for when the gas consumption was greatly increased, smothering occurred. Would Mr. Loughland advocate the use of a fan to withdraw the products of combustion at times of excessive consumption? The particular range to which he had referred did not allow of easy access to the burners; and he thought it unfortunate that the makers of the ranges, while they understood the fish-frying side of the business, should know so little about gas.

Mr. LOUGHLAND, speaking of condensers, remarked that several makers had been fitting these for some time, and they functioned very well. With regard to the flue bottom, he strongly advocated that

they should leave this open; otherwise ventilation might be impaired. In one case of which he had experience there were complaints about the quantity of steam which escaped into the shop. In this instance the flue was only 9 in. by 9 in., and the range was burning 600 c.ft. of gas an hour. The products of combustion from this quantity, coupled with the amount of steam generated in the pans, were too great to be dealt with by such a small flue. He advocated a separate duct for the steam; and where possible this should be carried up above the first floor before being taken into the common flue. Of course, in such matters the question of cost had to be considered; and it was often impossible to adopt this plan.

Mr. WESTBROOK suggested that there should be a separate flue—for example, similar to the "Nautilus" principle—carried to the top, without connecting with a common flue.

Mr. LOUGHLAND agreed that this would be a good plan.

Mr. T. V. GARRUD (Gas Light and Coke Company), referring to the question of discounts, said that these should be allowed, but they ought to be on a scale different from that relating to manufacturing consumption. He thought that it would be impossible to have uniformity on this point. The author had stated that 84 stones of fish and 1 ton of potatoes could be cooked by gas at an expenditure of 30s. In his (the speaker's) experience, the cost was greater than this. Also, Mr. Loughland's figure of 1·5d. per stone of fish and chips, with gas at 9d. per therm, was hardly a general figure.

Mr. LOUGHLAND said that, though his figures related to what could be termed an ideal installation, a customer in a certain part of his district was coping with a trade amounting approximately to 84 stones of fish and 1 ton of potatoes per week, and his cost for gas was 30s. This consumer had a three-pan range, and his trade was fairly constant—an important point.

### WHY NOT UTILIZE THE WASTE HEAT?

Mr. R. J. PEPPER (Gas Light and Coke Company), speaking of the author's figures for the efficiency tests of several gas-fired ranges, observed that the highest efficiency was 36·5 p.ct. and the flue temperature was 550° Fahr. Could not this high temperature be lowered, and some of the waste heat utilized, perhaps for the bringing-up of the ingoing gas and air for combustion?

Mr. LOUGHLAND said that no attempt had been made to do this, and it would not be easy. The way to obtain highest efficiency was to make the products of combustion travel as great a distance as possible round the pan before being led into the flue.

Mr. R. J. WILLSMER (Gas Light and Coke Company) remarked that the flue temperature was not an indication of the efficiency of a range, because of dilution effects. In the Davis burner shown, the secondary air was brought over the burner, and so became heated to a certain extent.

Mr. PEPPER agreed that a low flue temperature would be brought about by dilution. In his opinion, however, a scientifically constructed range should have proper control of the secondary air for combustion, as well as the primary air; and the fact remained that the flue gases were going away at 550° Fahr. If this could be reduced, and the waste heat saved, there was no reason why the efficiency of the range should not reach (say) 50 p.ct.

Mr. LOUGHLAND remarked that no attempt had been made to control the secondary air; and he agreed that if there were such control, the efficiency of ranges would be greatly improved.

### VOTE OF THANKS.

Mr. F. DYKE (South Metropolitan Gas Company) proposed, and Mr. MOGER seconded, a vote of thanks to Mr. Loughland.

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# GAS ACTS FOR 1927.

(*Continued from p. 820.*)

### MATLOCKS URBAN DISTRICT COUNCIL.

This is a General Act, which contains some clauses relating to the Council's gas undertaking. It had been originally proposed to extend the limits of supply so as to include the parish of Dethick Lea and Holloway; but this has been struck out. It shall not be lawful for the Council to supply gas within the limits of supply as on July 20, 1896, of the Matlock and District Gas Company, unless with the previous consent in writing of that Company. The price to be charged by the Council for gas supplied by them by meter shall not exceed 1s. 2d. per therm; and the Council shall not at any time charge consumers of gas within the portion of the gas limits which is outside the district a higher price than that charged to consumers in the district. The Act does not contain the clause fixing a minimum charge for prepayment supplies which appeared in the Bill; this having been deleted in accordance with a suggestion made by the Board of Trade.

The calorific value of the gas shall be not less than 500 B.Th.U. A maximum charge of 1s. is allowed for special meter readings. There is provision for the sale, subject to the consent of the Board of Trade, on six months' notice of desire to purchase, to any local authority whose district or any part thereof is within the gas limits of such portions of the works of the Council as are contained within the district of such authority (except any mains and pipes or other apparatus which shall be necessary for supplying with gas any other part of the gas limits).

[*Parliamentary Agents: Messrs. Lewin, Gregory, & Co.*]

### READING GAS COMPANY.

The Company are empowered by the Act to purchase scheduled land, and to use it for the storage of gas, as well as of coke and other residual products. The raising of additional capital is authorized, to an amount not exceeding £170,000, together with borrowing powers up to one-half. In the Bill the amount of new capital was placed at £200,000; but this was modified after negotiations with the Reading Corporation. The maximum charge for special meter readings is to be 1s. For stand-by supplies the Company are to be entitled to charge as a minimum a sum not exceeding 20s. per quarter. The original proposal was 25s.; but this was modified after discussion with the Corporation.

[*Parliamentary Agents: Messrs. R. W. Cooper & Sons.*]

### SALFORD CORPORATION.

This is a General Act, which contains a clause dealing with the recovery summarily of sums due for fittings. It has been somewhat altered from the form in which it appeared in the Bill, and now reads:

> If the Corporation commence proceedings for the summary recovery of a sum due for the supply of electricity, gas, or water, any other sum due or payable to the Corporation in respect of the sale or hire of any apparatus or fittings supplied by them for, or in connection with, the consumption or use of electricity, gas, or water (as the case may be) or the provision of materials and work in connection therewith, or the fixing, setting-up, repairing, altering, maintaining, or removal thereof, may be included in the same summons, and may be recovered summarily, provided the amount due or payable in respect thereof does not exceed £20.

[*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

### SCARBOROUGH GAS COMPANY.

This is a Consolidation Act, in which the provisions of the Bill as drafted have been considerably amended and added to. The limits within which the Company may supply gas shall be and include the Borough of Scarborough, the urban district of Scalby, and the rural district of Scarborough. If, however, after the expiration of five years from the passing of the Act the Company have not laid down mains for the supply of gas in any parish or part of a parish in the rural district of Scarborough, nothing in the Act shall prevent the local authority of that parish or portion of parish, or any company or person, applying for authority to provide such a supply, and for the repeal of the powers of the Company. The capital of the Company is fixed at £400,000, in various classes of stock; and it is specially provided that, in the event of the undertaking being purchased by the Borough of Scarborough, every holder of any of the 1895 ordinary stock shall be entitled to receive the price at which the amount of that stock held by him was issued by the Company. New stock is to be sold by auction or tender (except in the case of stock offered to employees under a profit-sharing scheme). Any stock offered but not sold by auction or tender may be offered at the reserve price to the holders of stock of the Company, and to the employees and consumers; and if not sold by either of these two ways, it may, for the purpose of realizing the best price obtainable, be otherwise disposed of at such price and in such manner as the Directors may determine. There are borrowing powers to the extent of half the paid-up capital.

The basic price of gas supplied by the Company is to be 9·2d. per therm, and the charge to be made to consumers in that part of the rural district of Scarborough which is at a greater distance than half-a-mile from the boundary of the borough shall exceed by 2·4d. per therm the price charged in the remainder of the limits. In the Bill, the basic prices named were 12d. per therm within the borough and 14·4d. outside. The basic dividend on the ordinary capital is fixed at 5 p.ct.; and this is the maximum rate of dividend for the preference stock. The section relating to the division of surplus profits, which was quoted when reviewing the Bill, has in the Act been amended to read:

> *Division of Surplus Profits if the Price of Gas is less than the Basic Price.*
>
> (1) At the end of each year after the commencement of this Act a calculation shall be made of the amount (if any) by which the total sum paid and payable by consumers for the gas supplied throughout the limits of supply during the year is less than the total sum which would have been payable for such gas if the price charged therefor had been the basic price, with (where applicable) the addition thereto required to be made by the section of this Act of which the marginal note is "Basic price of gas and basic rate of dividend on ordinary capital."

The amount so calculated is in this section referred to as "the consumer's benefit."

(2) If and so far as the balance standing to the credit of the net revenue account (after providing for dividend on the preference capital and dividends at the basic rate on the ordinary capital in the opinion of the Directors permits, a sum not exceeding one-sixth of the consumer's benefit may be applied in the increase of the dividends on the ordinary capital above the basic rate, and if and so far as not so applied shall be carried to the reserve fund to be established under this Act; Provided that no money shall be so applied unless the Company shall also out of such balance appropriate (which they are hereby authorized to do) an equal sum to the credit of any profit-sharing scheme established under this Act for the benefit of the employees of the Company.

(3) Any balance of the profits of the Company not applied as aforesaid shall be left at the credit of the net revenue account and carried forward to the next following year, subject to the provisions of the section of this Act of which the marginal note is "Limitation on carry forward."

The limitation on the carry forward remains as in the Bill, The gas is to be of 450 B.Th.U.

A new clause has been inserted to the effect that the Company are from time to time to file for public inspection with the local authority and with the Board of Trade statements of the conditions under which they are prepared to grant discounts on prices charged for gas supplied by them—such discounts to be alike in like circumstances. No sum is to be divided in excess of the basic rate or carried to reserve fund, or appropriated to any profit-sharing scheme established under the Act, in respect of any year in which the price charged to ordinary consumers is equal to, or more than, the basic price, with (where applicable) the addition required to be made in the outer part of the limits of supply. If the rate of dividend paid on the ordinary capital in any year (in which they could have paid a dividend at not less than the basic rate) is less than the basic rate, the difference between the amount so paid and the amount which would have been paid if the Company had declared a dividend at the basic rate may be carried to the reserve fund. The Company are also to send to the Board of Trade each year, with the accounts required under section 15 of the Gas Regulation Act, a statement showing the number of therms sold at each of the several net prices during the year to which the accounts relate (including gas supplied to public lamps), and such other relevant information as the Board may require. For the year 1928 and subsequent years the accounts are to show separate particulars of the gas supplied by the Company in the inner and outer parts of the limits, and such particulars as will enable the local authority to calculate the amount which for such year may be paid as dividend or carried to reserve, and appropriated to a profit-sharing scheme.

A further addition binds the Company not later than the session 1932 to promote a Bill proposing a revision of the basic price fixed by this Act, or giving an opportunity for such revision to be made. There are clauses authorizing the establishment of a profit-sharing scheme; and the Company are empowered to acquire certain lands. An amendment has been made to the clause giving the Company power to demand security for payment of rates. Originally the clause provided that the Company should be empowered to demand of a consumer security for the payment of one year of the rate for the gas to be supplied. The clause now authorizes the Company to demand security for the payment of all moneys which may from time to time become due to them in respect of the supply.

The clause relating to qualification of Directors has been altered to comply with the model form.

[*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

### SMETHWICK CORPORATION.

The main purpose of this Act is to extend the borough boundaries and the gas supply limits of the Corporation. It also contains a number of general clauses, designed to bring the gas undertaking up to date in this respect. It was explained when the Bill was before the Unopposed Committee of the House of Commons that the original intention was to extend the borough to include the whole of the urban district of Oldbury; but, as the result of negotiations with the authorities, it had been determined to annex only part of the urban district.

[*Parliamentary Agents: Messrs. Sherwood & Co.*]

### SOUTH STAFFORDSHIRE MOND GAS COMPANY.

Under this Act, each of the £10 shares of the Company is to be divided into ten £1 shares. There was, it will be recalled, considerable discussion before the Unopposed Committee of the House of Commons regarding the inclusion of clause 17 of the Bill, which was in the following terms:

17.—*Additional Powers of Manufacturing Gases and other Chemical Compounds.*—The Company may manufacture and store on all or any part of so much of the lands described in Part I. or Part II. of the schedule to this Act as is for the time being vested in them and may supply, sell, and deal in oxygen, hydrogen, nitrogen, carbon dioxide, carbon monoxide, ammonia, methane, ethylene, acetylene, sulphuric acid, hydrochloric acid, nitric acid, acetic acid, chloride of ammonia, and nitrate of ammonia; but nothing in this section shall be construed as enlarging the powers of the Company of laying-down mains or pipes in public streets or in private streets not belonging to the Company.

Eventually the Committee left it to the promoters to decide which course to pursue—viz., to withdraw clause 17 and allow the Bill to be reported for third reading without it, or to hold the Bill over until the autumn session, the Unopposed Committee meantime making a special report upon it. As the Company were extremely anxious to secure the other powers in the Bill, it was decided to adopt the first alternative. Thus the Act is without the clause above quoted.

To clause 16, which is reproduced, there has, it will be seen, been added in the Act a proviso. The clause provides that the powers conferred upon the Company, by their Act of 1901, of manufacturing, selling, and dealing in bye-products or residual products of the gases manufactured by them shall be extended to enable the Company, on scheduled lands:

To work-up and convert all or any of the residual products and materials arising from, or in, or in connection with the manufacture of such gases or of any other gas manufactured by any other company, body, or person, or from, or in, or in connection with such working-up or conversion.

To manufacture paints, preservatives, disinfectants, antiseptics, medicines for human beings and animals, and any other chemical compound or compounds of a like description, in the manufacture of which residual products arising from, or in, or in connection with the manufacture of gas by the Company or any other company, body, or person are not employed or the use of such products is subsidiary or ancillary, and to work-up or convert all or any of the residual products arising from, or in, or in connection with such manufacture.

To purchase from or sell to any other company or any body or person any such residual products.

To purchase or acquire from any source the materials required for such working-up and conversion or manufacture.

To sell and deal in the products of such working-up, conversion, or manufacture.

Provided that nothing in this section shall entitle the Company to manufacture exclusively from materials other than such residual products as aforesaid any chemical compounds other than such as are required for use in conjunction or association with any chemical compounds manufactured wholly or partly from such residual products.

[*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

### STOKE-ON-TRENT CORPORATION.

The Corporation are authorized by this Act to connect-up their Etruria and Longport Works by means of a main along a route passing through the urban district of Wolstanton United (which is not within the Corporation's gas supply limits), and to acquire the necessary lands and easements. The works authorized shall not be used for the purpose of supplying gas in the urban district of Wolstanton United without the previous consent in writing of the Council of that district. The powers of the Corporation for the compulsory purchase of lands and easements for the purpose of this scheme shall cease after the expiration of three years from the passing of the Act. The interests of the Wolstanton United Urban District Council are safeguarded; and there are also a number of other protective clauses. The Corporation are given power to require consumers to repair apparatus in a dangerous condition, or otherwise to cut-off the supply of gas, and to recover expenses "reasonably incurred" (instead of the usual "lawfully incurred") in cutting-off and subsequently re-connecting. For the carrying out of the works authorized by the Act, the Corporation are authorized to borrow £14,500, repayable in twenty years from the time of borrowing.

[*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

### WALLASEY CORPORATION ACT.

At the time of writing, the Wallasey Corporation Bill was still in Parliament; and reference to the contents must be deferred until a copy of the Act is available.

### WEST BROMWICH CORPORATION.

The Borough of West Bromwich is extended by this Act so as to include part of the urban district of Perry Barr, and also the limits of gas supply to cover the added area—which added area "shall cease to be within the limits for the supply of gas of the Corporation of Birmingham." There is provision for the purchase by the West Bromwich Corporation from the Corporation of Birmingham (at a price to be fixed by arbitration, failing agreement) of all gas mains, pipes, and other works, belonging to them and situate within the added area. The period for repayment of any sum required for this purpose is twenty years. Section 126 empowers the Corporation to make by-laws requiring the provision of hearths in any dwelling house to be erected in the borough.

[*Parliamentary Agents: Messrs. R. W. Cooper & Sons.*]

## PROVISIONAL ORDER.

### DUNDEE CORPORATION.

The Dundee Corporation Provisional Order was delayed in its passage through Parliament; and notice of it is deferred.

# MIDLAND JUNIOR GAS ASSOCIATION.

A Meeting of the Association was held in the Council House, Birmingham, on Dec. 15—Mr. H. R. HEMS (President) in the chair.

The CHAIRMAN welcomed Mr. John Terrace, M.Inst.C.E., Chief Engineer of the South Suburban Gas Company. Mr. Terrace was, he said, the President-Elect of the Institution of Gas Engineers. They greatly appreciated his work in connection with the Education Scheme. He was a member of the Gas Education Committee, a member of the Board of Examiners in Gas Engineering, and an examiner in gas-works practice for the City and Guilds of London Institute.

Mr. TERRACE thanked the members for the welcome. The work of the Junior Gas Association, he said, was well-known and greatly appreciated; and as Vice-President of the Institution he was pleased to have had the opportunity of being present at one of their ordinary meetings, in order to show the real interest they took in their proceedings, and to learn at first hand how their work was carried on. He thought it would be fitting to make a few remarks as to the relationship existing between the Senior Body and the Junior Associations. The work of the latter was largely educational, and in that way they were performing useful service. It was appropriate that the question of education should have been the means of bringing into closer contact the Institution of Gas Engineers, the District Associations, and the Junior Associations. Those who were acquainted with the Education Scheme knew that the District Education Committees were now composed of representatives of the District Associations and the Junior Associations, together with the help of a member of the education authority. Their President had referred to his (the speaker's) connection with the Scheme; and he could assure them that he took the greatest interest in it, not only because he believed that the future of the gas industry was largely bound up in the education of the junior members, but because he was satisfied it was the one way in which they were going to get that unity of service which was so useful in the industry. Mr. Terrace expressed the hope that they were taking an interest in the question now before the Council of the Institution on the matter of widening its doors. They would have seen references to this subject in the Technical Press. The good work of the Junior Associations was fully recognized; and he hoped that it would continue.

A warm welcome was also given by the President to Mr. John Foster (Engineer-in-Chief of the Birmingham Gas Department), Dr. C. M. Walter (Birmingham Research Laboratories), Mr. T. H. Poulson (Stafford), and Mr. J. C. Pearson (Engineer at the Windsor Street Gas-Works).

## THE INSULATION OF HEAT.

By J. S. HAYWOOD, of the Industrial Heating Section of the Birmingham Gas Department.

[EXTRACT.]

The heat transferred through a furnace wall varies directly with the surface area, the difference of temperature between the two faces, and the thermal conductivity of the material used, and is inversely proportional to the thickness.

The formula for heat flow through a wall (*i.e.*, conduction) is:

$$H = c/d\,(T_1 - T_0).$$

Where H = B.Th.U. per sq.ft. per hour.
$c$ = thermal conductivity at mean temperature.
$d$ = thickness of wall.
$T_1$ and $T_0$ = temperatures of hot and cold faces.

The emission of heat from the outer surface depends on convection and radiation. In the case of the outer surface, the loss depends on the difference between the surface temperature and that of the surrounding medium—air in most cases—the actual temperature of the surface, and in a smaller degree on the nature of the surface, its colour, its degree of smoothness, and the material of which it is made.

The convection loss is increased by draught, and is greater from the roof than the sides.

Referring to radiation losses, however, we have impressed upon us the need for insulation at higher temperatures. The heat radiated from a surface rises rapidly with increase in temperature, as shown by tests made by C. R. Darhil. For instance, a casing of a furnace at 270° Fahr. will radiate 575 B.Th.U. per sq. ft. per hour, but at 570° it will radiate 2400 B.Th.U. In fact, the loss by radiation depends not on the difference of temperature, as does conduction, but on the difference of the fourth powers of the absolute temperature. According to the Stefan-Boltzman Law,

$$H = A_1 R t \left[\left(\frac{T_1}{100}\right)^4 - \left(\frac{T_2}{100}\right)^4\right]$$

where H is the heat radiated across the air space, by A sq. ft. in $t$ hours, at a temperature difference $T_1$ to $T_2$; R being the constant for various surfaces and materials. Taking unit area and time, the factor R works out at 0·162 for black-body conditions.

### APPLICATION OF INSULATORS.

We will consider medium temperatures, such as those obtaining with steam pipes and boilers. In this series, we have loose materials, sectional coverings, and plastic coverings.

With regard to loose materials, we have slag wool, asbestos, and silk waste. The great detriment to this type is its tendency to settle down and solidify; and various methods have been used to keep same in place—such as supporting rings, wire round split laths, or metal cases supported on three points. As silk waste is affected by the temperature of high-pressure steam, slag wool is generally used.

Sectional coverings include magnesia, cellular asbestos, and rope laggings. The first-named is composed of 85 p.ct. magnesium carbonate and 15 p.ct. asbestos as a binder. The second is constructed of asbestos millboard; corrugated sheets being laid alternately with plain ones. The rope series is usually made up of asbestos webbing, filled with magnesia or asbestos fibre. Magnesia begins to lose its cellular condition at 450° Fahr.

Sectional coverings are generally bound with stout canvas, and further held together by bands of steel or brass. They can be removed or applied easily, being moulded in halves, and are more suitable for small diameters, where the adhering surface for loose or plastic coverings is slight.

Rope laggings are seldom used on anything but small pipes with awkward bends; the interstices between the laggings greatly reducing the efficiency.

Referring to plastic coverings, these are moulded on to the pipe on site. The general method employed is to apply ½ in. of material (generally having an asbestos base) which will withstand the first shock of the heat, and then 1 in. of insulating material—slag wool, magnesia, &c.—finishing-off with hard insulating cement.

A series of tests on the laggings of pipes (end effect not allowed for) has been carried out at the Industrial Research Laboratory, with the following results:

| Temperature of Room, 19° C. | Internal Temperature, 600° Fahr. |
|---|---|
| Material. | B.Th.U. per Sq. Ft. of Surface per Hour. |
| Asbestos covering | 647 |
| Magnesia and composition | 509 |
| "Kisol" (composite) | 440 |
| Magnesia | 360 |

For these tests, the materials were not all of the same thickness, but were tested as it was intended they should be used in particular cases. The average amount of heat radiated from a bare pipe may be taken as 2·7 B.Th.U. per hour per sq. ft. of surface per degree Fahrenheit difference in temperature—*i.e.*, 1450 B.Th.U. at 600° Fahr. From this we have:

$$\frac{1450-440}{1450} = \frac{1010}{1450} = 70 \text{ p.ct. roughly.}$$

However, the tests, allowing for end effect, give a figure of 90 p.ct. saving on bare pipe loss, using "Kisol" type material.

As an example of lagging, a section of the top setting of the vertical retorts at the Windsor Street Gas-Works was lagged. The saving amounts to 9 tons of coal per retort per annum, besides the greater convenience to the workers, and better working conditions.

No less than 75 to 80 p.ct. of the heat given off by the bare pipe of a similar area is lost at flanges. Special boxes, made in half sections, lined with the insulator used, are now made for conserving this heat.

### HIGH-TEMPERATURE INSULATION.

Having described the methods employed at Birmingham for testing materials for high-temperature insulation, the author discussed the results of tests on a 3:1 mixture of sand and cement, a Stourbridge firebrick, ordinary red brick, common insulating brick, and good insulating brick. The heat lost through firebrick, he said, is nearly four times as much as that lost when a good insulator is employed. By inserting a course of insulating brick in a wall of firebrick and red brick having a loss of 630 B.Th.U., the loss is reduced to 195 B.Th.U.—roughly, one-third.

Most of the bricks in use to-day have a low mechanical strength, ranging from 200 to 400 lbs. per sq. in., and are thus generally placed behind a course of firebrick which takes the load and abrasion; the bricks being unable to withstand abrasion, as they are soft and easily crumble. The bricks are seldom used where direct temperatures exceed 800° to 850° C.; but special bricks, of a slightly lower efficiency, are now made to withstand 1100° C.

The following figures are of interest:

| Material. | Temp. Range, °C. | Loss in B.Th.U. per Sq. Ft. per Hour per In. per ° Fahr. |
|---|---|---|
| Insulating brick . . . | 400 to 700 | 0·65 to 0·75<br>0·69 ,, 1·0 |
| Red brick . . . . . | 400 ,, 700 | 7·0 ,, 8·0<br>7·50 ,, 18·0 |
| Firebrick . . . . . | 500 ,, 1100 | 4·06 ,, 6·67 |

The instances where this saving of heat can be made are very numerous. To gas engineers, furnaces, retorts, stoves, and kilns are the most important. But besides the saving of fuel which results from insulation, other advantages are:

(1) Greater uniformity of temperature—so important in such operations as glass annealing, heat-treatment, porcelain manufacture, and even bread baking.
(2) Increase in capacity of equipment.
(3) More accurate control of temperature.
(4) Better working conditions.

### Discussion.

The PRESIDENT said that industrialists were becoming more alive to the need and the value of insulating material; and it was destined to play a greater part in the solution of heating problems. The author of the paper had demonstrated what a large amount of heat was radiated from various surfaces.

Dr. WALTER (Industrial Research Laboratories, Birmingham), in moving a vote of thanks to Mr. Haywood, said it seemed to be only a few years since they were putting up their furnaces without any reasonable form of insulation. Makers were now catering for modern needs in whole-hearted fashion, and were producing insulating material which gave high efficiencies. In some of their larger furnaces, working continuously, there had been effected a saving of not less than 10 p.ct. The question of insulation was important to works engineers and managers whose equipment included steam pipes and hot-air mains.

The resolution was seconded by Mr. A. R. MYHILL (Nechells Gas-Works Laboratory), who observed that the contribution was particularly welcome because there was scant literature on the subject. It was very important, he added, that the lagging material should be perfectly dry before it was coated.

Mr. PEARSON said there was no doubt that insulation was essential for steam mains and waste-heat boilers, and was very desirable for many other classes of work on gas undertakings. Magnesia figured prominently in the better qualities of insulating material, but, being fragile, it should be guarded, to keep it in position.

Mr. FOSTER also emphasized the point that it was extremely difficult to get insulating material which was mechanically strong and durable. In this field there would appear to be great scope for enterprise.

Mr. POULSON (Stafford) stated that he had found the use of aluminium paint satisfactory. He believed it was a paying proposition to insulate steam mains, even if such work had to be done every twelve months.

## YORKSHIRE JUNIOR GAS ASSOCIATION.

A Meeting of the Association was held on Dec. 17 at Brighouse, where—through the courtesy of the Mayor and Corporation, the Gas Committee, and the Engineer and Manager—the members were allowed to inspect the gas-works during the afternoon, and later to adjourn to the municipal offices to listen to a paper by Mr. W. E. Stephenson, Chemist to the South Bank Gas Company. The chair was occupied by Mr. C. H. CHESTER, of Wakefield, President of the Association.

### INCIDENTALS IN THE MANUFACTURE OF 400 C.V. GAS.

By W. E. STEPHENSON, of South Bank.

My purpose in reading this paper is not to provoke a discussion on gas values, but to present to you a few considerations which may be taken when installing and running a plant to produce a 400 B.Th.U. gas. The chief object in coming down to 400 is to have as much complete gasification as possible, and yet supply a gas which possesses all the essential properties of a high-grade gas. It goes without saying that the obsolete flat-flame burner cannot be taken into consideration, as cooking, heating, and lighting by incandescent burners are the chief uses to which our gas is put.

Before one makes an article, it is usual to ascertain if there will be a sale for it. Similarly we must look to the district and see what kind of a 400 B.Th.U. gas is required. Foremost, as with any other grade, are constant pressure and constant composition, which means that constant calorific value and specific gravity demand our first consideration. So we must set out to formulate an ideal composition—one that will present no great difficulty in working to, and which contains a maximum of combustible constituents relative to the ease of manufacture. From a practical point of view, this is necessarily largely governed by the plant available; but in my paper I propose to neglect this and to see if we can discover the factors which in low-grade gas lend themselves to economical efficiency and, if considerations allow, cheap gas. I say "economical efficiency," because in gas manufacture, in common with many other processes, there is a limit to which we can let our operations go to be efficient and economical. I am afraid that at times we are apt to overlook this fact. Not only must we consider the consumer and efficiency when specifying the composition, but the meters and fittings also demand our attention. We require freedom not only from hydrogen sulphide and ammonia, which are banned by the Gas Regulation Act, but also from excess of oxygen and cyanogen, and undesirable quantities of naphthalene.

The first and last of these substances are under our control; and, as will be seen later, a low-grade gas cannot be either made or distributed properly by drawing a high-grade gas down with air. In our case naphthalene rarely troubles us, owing to the large quantities of diluent gas present in the mixture, which acts as a vehicle for it, carrying it forward to the consumer's burner. We atomize a mixture of petroleum spirit and special neutral lubricating oil into the district mains on the outlet of the station governors. This has a twofold action. It lubricates the meters, having a beneficial action upon the diaphragms, and it arrests any naphthalene which may have been deposited in the mains or services.

#### PRESSURES.

The question of pressure need present no special difficulties, as the problems are identical with those of a high-grade gas of the same specific gravity. The claim that a greater pressure is needed for a low-grade gas is groundless, for it is possible—in fact, it is our daily practice—to manufacture gas of almost the same density as a high grade; and as the flow is inversely proportional to the square root of the density, the volumetric capacity of the mains is approximately the same. It might be argued that, as the calorific value is about one-fifth below the usual quality, the distribution system is only capable of dealing with a similar proportion of therms. In answer to this I can only say that during the six years we have been supplying this quality we have not had the slightest trouble from this cause. The reason may be that the large quantities of naphthalene-free diluent gas and the thin stream of petroleum vapour have taken up a coating of naphthalene. By this statement I do not wish to infer that our mains held an unduly large quantity; but we have found places in our principal mains where a reducing piece has set up friction and caused a large quantity of naphthalene to be deposited a few yards farther on. This had precisely the same effect as a partly-shut valve. However, when we came on 400 gas, these blockages disappeared. The constituents of town gas have calorific values and specific gravities as follows:

| — | Calorific Value. | Specific Gravity. |
|---|---|---|
| Carbon dioxide . . . . . | .. | 1·522 |
| Carbon monoxide . . . . . | 330 B.Th.U. | 0·968 |
| Oxygen . . . . . | .. | 1·1066 |
| Methane . . . . . | 1024 B.Th.U. | 0·554 |
| Hydrocarbons . . . . . | 1603 ,, | 0·969 (air 1·0000) |
| Hydrogen . . . . . | 325 ,, | 0·0693 |
| Nitrogen . . . . . | .. | 0·9721 |

It will be seen that the "inerts"—the $CO_2$ and $N_2$—have the highest specific gravities. For this reason, they must be kept at a minimum.

#### METHODS OF MANUFACTURE.

There are several possible ways of making a 400 gas, the chief of which are:

(*a*) Diluting a straight coal gas with air.
(*b*) Over-exhausting a straight coal gas.
(*c*) Steaming vertical retorts.
(*d*) Diluting a rich straight coal gas with blue water gas.
(*e*) Enriching a Tully gas or a similar gas with straight coal gas.

(*a*) This is the simplest method, but it must be ruled out. If a large quantity of air is added to high-quality straight coal gas, the oxygen and nitrogen contents become excessive. A 400 gas of this character has a specific gravity of 0·527, and an inert content of 30·5 p.ct.—or almost one-third of its volume.

(*b*) This must also be ruled out for practical reasons, as over-exhausting is one of the principal causes of stopped and

pitched-up pipes and mains, owing to the hot furnace gases being drawn-in through cracks in the retorts and cracking-up the tarry vapours, with deposition of pitchy matter in the ascension pipes. Moreover, the furnace gases contain a large percentage of $CO_2$ and $N_2$.

Summing-up Mr. E. V. Evans' observations on the effect upon thermal yield and composition of the gas of carbonizing in sound and leaky retorts—see Cantor Lectures, 1924, "JOURNAL," Vol. 165, February and March—we see that, by the addition of producer gas in the retort, the thermal yield can be increased; and it strikes me that here a certain amount of useful research work could be done, as an increased rate of carbonization means a greater throughput; and consequently a smaller amount of retort house plant would be in action. Perhaps if a highly preheated blue water gas were passed over the charge during the latter half of the carbonizing period, substantially better results might be obtained without an increased fuel consumption in the retort house furnaces. Also a higher percentage of $CO_2$ would not be objectionable in the water gas, as it would be reduced to CO during its passage over the charge.

(*c*) If we refer to the report of the Uddingston tests,* we shall see that, as thermal yield increases, the calorific value falls at a rate proportional to the steam input and coke decomposed in the retort, other conditions remaining fixed. Thus, in the first test, when a 544 gas is being made, 50·49 therms in gaseous form and 59·48 p.ct. of coke by weight are obtained per ton of coal carbonized, no steam being admitted. When 13·3 p.ct. of steam is admitted, the make goes up from 9367 c.ft. of 544 gas to 12,666 c.ft. of 482 gas, which gives a thermal yield of 61·05; while the coke loss is only 1·79 p.ct. In the fifth test, when a 410 gas is obtained, 44·8 p.ct. of steam is admitted, 19,593 c.ft. of gas are obtained, which gives 80·33 therms and 51·69 p.ct. of coke per ton. With the water gas reaction being endothermic, the fuel consumption is appreciably increased; yet from a financial point of view this is not serious.

(*d*) Bringing down a straight coal gas with water gas is a more general method, and could be worked along with partly-steamed vertical retorts.

We will now study the technical results of this and (*e*) on a works making about 520,000 c.ft. per day. The proportion of the work (*d*) done would be roughly:

| | | | | |
|---|---|---|---|---|
| Retort house . . | 216,000 c.ft. of 540 gas .. | 1166·4 therms, | 41·8 p.ct. |
| W.G. plant . . | 300,000 „ „ 300 „ .. | 900·0 „ | 58·2 „ |
| | 516,000 c.ft. of 400 gas .. | 2066·4 therms. | |

In (*e*), by bringing-up Tully gas or similar total gasification gas, the load would be distributed as under:

| | | | |
|---|---|---|---|
| Retort house . . | 186,000 c.ft. of 540 gas .. | 1003 therms, | 34·7 p.ct. |
| Tully gas . . . | 350,000 „ „ 340 „ .. | 1190 „ | 65·3 „ |
| | 536,000 c.ft. of 400 gas .. | 2193 therms. | |

The slight difference in the two makes is merely so that we can work with round figures. The calorific value of the mixed gas in each case is slightly over 400, but as a certain amount of air must be added for purification, the calorific power of neat mixture must be slightly in excess of the declared value. In the first example, 216,000 c.ft. of 540 gas at 12,000 c.ft. per ton (64·8 therms) requires 18 tons of coal, and leaves about 9 tons 18 cwt. of coke for disposal. Of this, 5 tons are required on the water gas plant, *plus* 1 ton 13 cwt. for steam for the water gas. If a waste-heat boiler is installed, and both blast and blue gases are passed through, the amount of steam generated will be about 80 lbs. per 1000 c.ft. of water gas made. Of this, the generator will require 35 lbs. and the blower 38 lbs. per 1000 c.ft. made—a total of 73 lbs., or almost the whole of that generated. The net amount of coke for disposal, neglecting the quantity used for other purposes on the works, will be 3 tons 5 cwt.

In case (*e*), to make 186,000 c.ft. of straight coal gas as above, 15 tons 10 cwt. of coal are required, yielding 8 tons of coke. To make 350,000 c.ft. of 340 gas at 53,800 c.ft. per ton (182·9 therms), the Tully plant will require 6 tons 10 cwt. of coal. To assist the gasification of this, 2 tons 7 cwt. of coke are used for steam raising; the process wanting 22 tons of coal and leaving 5 tons 13 cwt. of coke for disposal.

If we tabulate the above, and apply them to a 200 million c.ft. works for twelve months' working, we get a better idea of the situation—see Table I.

TABLE I.

| — | With W.H. Boiler. | Without. | (*e*.) | 500 Gas. |
|---|---|---|---|---|
| | Tons. | Tons. | Tons. | Tons. |
| Coal used retort house . . | 7000 | 7000 | 5780 | 15,380 |
| „ „ Tully . . . . | *Nil* | *Nil* | 2430 | *Nil* |
| Total . . . . . | 7000 | 7000 | 8210 | 15,380 |
| Coke made . . . . . | 3850 | 3850 | 3180 | 8,460 |
| „ for steam . . . . | *Nil* | 650 | 886 | *Nil* |
| „ „ water gas . . . . | 1940 | 1940 | *Nil* | *Nil* |
| „ „ disposal . . . . | 1910 | 1260 | 2294 | 8,460 |

* See "JOURNAL," Vol. 150, p. 609.

The greatly decreased coal consumption is noticeable, for with method (*d*) only 45·5 p.ct. of the coal is required when compared with an equal make of 500 gas, or 54·6 p.ct. if compared on a thermal basis. In case (*e*) the quantity is reduced by 53·3 p.ct. There is, of course, a substantial reduction in the coke returns, these being 75 and 82·7 p.ct. respectively in case (*d*), and 70·5 p.ct. in case (*e*), yet on the whole I am inclined to think this is by no means a drawback to more complete gasification, for we all know how uncertain and erratic the coke market is in both price and demand. I know that many of you have worked up really good markets for this commodity, so that storage is reduced to a minimum and the average price is fairly good. But is the market sufficiently stable to stand, and be added to as the extra coke through increased gas sales is produced? Then there is another point. For what purposes is the coke being used? Is it for purposes for which we ought to be selling gas? For example, employment in high-efficiency coke cooking ranges. We must not lose sight of the fact that our prime purpose is to make and sell gas; and one ton of coke in the water gas plant will produce 180 therms of gas, 60,000 c.ft. of 300 gas which only requires the addition of 100 B.Th.U., or 1 gall., of oil per 1000 c.ft., to bring it up to our standard, which possesses all the desirable qualities of a higher grade, including the distinct odour of coal gas.

### THE COKE MARKET.

In our case the quantity of coke available for sale is appreciably reduced, so that the amount for disposal is within such limits of demand that a fair price can always be obtained for it, without having to devote valuable space for storage in the summer time. As Dr. Smith pointed out some three years ago, coke, like coal, deteriorates when stored in the open; and closed stores are expensive, cumbersome, and generally undesirable—to say nothing of the idle money in such stacks. Though I do not wish to belittle the value of the coke market, we must face the fact that the coke oven proprietors are now seriously turning their minds to the domestic market, which means that competition will become acute. At the present time gas coke, properly made, is a superior fuel; but how long this supremacy will last we cannot say. All we can do is to work on the old axiom, "a good article sells itself." The first essential in making a good coke is to start off with a good coal. This is an expensive matter when large quantities are required; but in the case of a low-grade works this is not a serious item, owing to the comparatively small amount required, and when compared with the substantially better carbonizing results good coal is a paying proposition. The selling price of the coke, however, is usually the ruling factor with the purchaser; and as the coke oven owners are generally financially interested in the colliery company, the figure at which the coal is advised to the ovens need have no relation to the current market value.

### CAPITAL EXPENDITURE.

In the foregoing, I have tried to present to you a short unbiased review of the factors connected with a 400 works. Yet there are several rather good features which may escape notice, and among them is the smaller amount of capital expenditure required at the works. This is effected in two ways: (*a*) By less retort house and auxiliary plant; and (*b*) by less holder capacity. These economies are brought about by the large use of the water gas or similar plant. The saving of storage is also due to this, and the ease with which they can be started-up. Twelve hours of maximum load is usually sufficient storage.

A working economy is also effected by the almost complete avoidance of "slow fires" in the retort house; for with a carburetting plant, retort house quality can be produced during the times of sudden load. I do not recommend this as a constant working feature, as there would be nothing to fall back upon. If the water gas plant is installed in duplicate, it is good to have one carburetted set and one blue plant with a waste-heat boiler, or two plants with boilers and one carburetted set—the repairs on the latter being done during the slack period.

We produce a Tully gas of an average calorific value of 340 B.Th.U., by the use of coal alone. The average analysis of many tests over a considerable period is:

| | P.Ct. | | P.Ct. |
|---|---|---|---|
| $CO_2$ . . . . . | 6·8 | $CH_4$ . . . . . | 6·5 |
| $O_2$ . . . . . | *Nil* | $H_2$ . . . . . | 51·4 |
| CO . . . . . | 31·1 | $N_2$ . . . . . | 3·9 |
| $C_nH_m$ . . . . | 0·3 | | |

Total inerts, 10·7 p.ct. Sp. gr., 0·517.

We have little difficulty in working provided we are careful in the selection of a suitable fuel. When a sample is submitted for analysis, we test it in the Lessing coking furnace for expansion and yield of gas by the standard method, and proximate analysis by the crucible test. When studying the results we pay the most attention to the expansion and physical properties of the ash, rejecting all samples which swell more than a quarter of their original volume, as they have a tendency to "hang" in the retort. We regard with suspicion any coal which leaves a red or clinkery ash. We have found that coals which leave a white ash are generally the most suitable fuels.

At South Bank we have no water gas plant, so that my calculations and remarks are based on my experience and the yields obtained at another works. In the making of water gas considerable discussion has taken place over the most economical percentage of $CO_2$ allowable in the blue gas. I have found about 6 p.ct. to give the best all-round results. This gives an analysis as follows:

| | P.Ct. | | P.Ct. |
|---|---|---|---|
| $CO_2$ | 6·2 | $CH_4$ | 1·0 |
| $O_2$ | 0·2 | $H_2$ | 52·0 |
| CO | 36·1 | $N_2$ | 4·5 |

Total inerts, 10·9 p.ct. Calculated calorific value, 299 B.Th.U. Sp. gr., 0·532.

**Discussion.**

The PRESIDENT stated that he was particularly interested in the subject of the paper, as prior to coming to Wakefield he had experience of a valuable nature at South Bank. He asked the members to discuss the question whether 400 C.V. gas could successfully compete with 500 gas.

Mr. A. E. WILSON (Halifax), in paying tribute to the splendid assistance given him in regard to studies and his reading by Mr. W. B. McLusky, the Engineer and Manager of the Halifax Corporation Gas-Works, added that it was only to be expected that, as they had been manufacturing 410 B.Th.U. gas at their works in Halifax for a considerable time, they were particularly interested in the paper by Mr. Stephenson. Contrary to the opinion expressed by the author, Halifax had found no need for the admission of air for purification of lower-grade gas, neither did their experience agree with that stated by the author in regard to the dilution of straight coal gas. Mr. W. R. Herring, formerly of Edinburgh, had said in 1906 "that neither luminosity nor calorific power alone accounted for the efficiency of the gas when burned in an incandescent burner. . . . Flame volume was a factor of even greater importance than calorific power. Flame volume must be dependent upon the chemical composition of the gas, which could vary very considerably for gases of the same luminous value and approximately the same calorific power." Their practice at Halifax, continued Mr. Wilson, comprised verticals (steamed) and inclines (diluted). They had three diluents at their disposal:

TULLY GAS.
Average calorific value, 310 B.Th.U.

| | | |
|---|---|---|
| CO | 34·3 p.ct. | |
| $H_2$ | 45·0 ,, | |
| $CH_4$ | 5·6 ,, | Short flame. |
| Inerts | 15·1 ,, | |

BLUE GAS (C.W.G. PLANT).
Average calorific value, 310 B.Th.U.

| | | |
|---|---|---|
| CO | 45·4 p.ct. | |
| $H_2$ | 43·5 ,, | |
| $CH_4$ | 2·1 ,, | Short flame. |
| Inerts | 9·0 ,, | |

PRODUCER GAS.
Average calorific value, 80 B.Th.U.

| | | |
|---|---|---|
| CO | 9·8 p.ct. | |
| $H_2$ | 8·4 ,, | |
| $CH_4$ | 1·6 ,, | |
| Inerts | 80·2 ,, | Long flame. |

Dealing with Mr. Herring's remarks that gases of the same calorific power could have vastly different flame volumes, he presented the following examples of 410 gas, manufactured by the Halifax plant:

| — | Verticals and Producer. | Verticals and Blue Water Gas. | Verticals and Tully Gas. | Verticals and Air (Theoretical). |
|---|---|---|---|---|
| | P.Ct. | P.Ct. | P.Ct. | P.Ct. |
| $CO_2$ | 3·5 | 4·8 | 4·7 | 2·0 |
| $C_nH_m$ | 1·8 | 1·4 | 1·5 | 1·8 |
| $O_2$ | 1·4 | 1·0 | 1·0 | 2·8 |
| CO | 11·5 | 25·0 | 20·4 | 10·2 |
| $H_2$ | 43·7 | 44·8 | 47·2 | 43·0 |
| $CH_4$ | 18·0 | 14·1 | 14·6 | 18·6 |
| $N_2$ | 20·1 | 10·0 | 10·6 | 21·6 |
| Calorific value | 410·68 | 410·48 | 410·37 | 410·09 |
| Flame volume | Excellent | Very short, "roaring" | Very short, "roaring" | Excellent |

| — | Inclines and Producer. | Inclines and Blue Water Gas. | Inclines and Tully Gas. | Inclines and Air (Theoretical). |
|---|---|---|---|---|
| | P.Ct. | P.Ct. | P.Ct. | P.Ct. |
| $CO_2$ | 3·4 | 2·0 | 2·0 | 1·8 |
| $C_nH_m$ | 2·6 | 1·8 | 1·9 | 2·6 |
| $O_2$ | 1·0 | 0·6 | 0·6 | 3·2 |
| CO | 7·0 | 28·4 | 22·6 | 5·4 |
| $H_2$ | 37·2 | 42·0 | 43·4 | 35·8 |
| $CH_4$ | 20·0 | 12·8 | 14·2 | 21·1 |
| $N_2$ | 27·8 | 12·4 | 15·3 | 30·1 |
| Calorific value | 414·64 | 409·70 | 411·25 | 415·88 |
| Flame volume | Long, languid | Short, too intense | Short, too intense | Long, languid |

With inclines it was more difficult to dilute a very high calorific gas, but steamed verticals needed less dilution. Halifax was now working on inclines, verticals (steamed), and blue gas, and was making an excellent gas of an average calorific value of 408 B.Th.U., with good flame volume. The carbon monoxide content was reasonable, and the hydrogen was in the region of 43 p.ct.

Mr. J. B. BALMFORTH (Bingley) expressed surprise that the 400 B.Th.U. gas satisfied the consumers in Halifax. During the war they had tried 450 gas in Bingley, and many complaints were received regarding lighting-back, &c. The advocates of low-grade gas did not sell their product any cheaper; the price of gas even at Halifax was not any lower than 500 B.Th.U. gas. At Bingley the average C.V. was 475 B.Th.U. The tendency throughout the country was to increase values. If South Bank required 1 gallon of oil to make up to the 400 B.Th.U., with the present price of coke and labour it would not make the cost any cheaper than the use of verticals and horizontals. If 400 B.Th.U. gas was best for the plant and district of South Bank, he would like to know the cost.

Mr. J. W. ROPER considered that 475-500 gas was much more suitable for all-round purposes than 500-550 gas.

Mr. CHARLES R. INGHAM (Engineer and Manager of the Brighouse Gas-Works) said that his Committee, as well as himself, were all believers in high-grade gas. They considered that 500 gas was the best for their particular area, and had just installed new plant to give this grade. It had been stated that with water gas a smaller holder capacity would be ample; but it would be well to consider the other side of this question. If a sudden demand was made, it might be possible to meet that demand; but would it not be with a different quality of gas from that normally supplied? Such a supply would surely not be in the best interests of the industry. It was a primary duty to adhere to constant quality. In his opinion, it was a mistake to reduce holder capacity with the idea of compensating for it by water gas. It was possible, by carbonizing coal and selling residuals in the open market, to make gas as cheaply as by any water gas process yet invented. If a reduction in grade from 500 to 400 B.Th.U. was made, this was equivalent to a reduction of 20 p.ct., and the capacity of the works was also immediately reduced by this amount. Also, the capacity of the mains was brought down by the same extent. This was a factor which should surely be set against any saving which might be effected in capital costs on carbonizing plant.

Mr. J. W. WOOD (Leeds) observed that before the time of Mr. Herring's statement, which had been quoted, experiments had been made showing among different gases a great diversity in flame shape and flame volume. The same appearance of flame by no means represented the same degree of aeration, for different grades of gas needed various degrees of aeration. If a small quantity of air was added to gas, it would not affect combustion. Respecting the effect of a reduction of quality upon gas cookers and gas fires, experience at Leeds showed this to be more a question of proper adjustment of appliances.

Mr. S. T. S. MUSGROVE (Sheffield) asked if Mr. Stephenson could tell them how he mixed the coal gas and water gas before sending out the supply to his district, and whether variation in this mixture, even if only slight, had any drastic effect on the appliances. He disagreed with the opinion expressed by Mr. Wood with regard to the reduction in calorific value and its effect on appliances. Sheffield had found that a reduction affected cookers and fires more than lighting appliances; and on furnaces the effect was still more apparent. A variation of 10 B.Th.U. on furnaces had a very marked effect. The gas industry could not afford to ignore the coke market.

Mr. H. L. BATEMAN (Dewsbury) said that from his small experience of this question, gained in different parts of the country, he had formed the opinion that the best policy for a gas undertaking was to make a straight coal gas and dilute with a good producer gas. Dewsbury's experience had proved this to be the best method for its own particular district. He suggested that members should make a graph showing the net actual cost per 1000 c.ft., and on this indicate the make per ton. From this they would find, on the policy indicated above, that the lowest cost would be in the neighbourhood of 15,000 c.ft. per ton, which was as far as one need to go. If the graph was taken further—say, to 20,000 or 25,000 c.ft. per ton—the costs were likely to be increased. It was up to the gas undertakings to cater for the coke market. At Dewsbury they had attempted grading, and the results had been most gratifying. The demand during the current year had gone up by leaps and bounds, so much so that the Dewsbury Corporation had decided to put in a larger grading plant. Mr. Bateman mentioned a peculiar form of pitch which was deposited on various parts of apparatus both at the works and on the district when a low-grade gas was used.

The PRESIDENT said that, from actual experience, 400 C.V. gas was undoubtedly the best for the South Bank area; but for Wakefield it would perhaps be the worst. One had not only to decide on the most suitable product for a particular area, but also to take into serious consideration the capacity of the plant at one's disposal; for, as had been pointed out, the reduction in B.Th.U. meant a reduction in works capacity. He considered that it was easier to maintain the quality of a 400 gas than that of a 500 gas. Had Mr. Stephenson carried out any experiments with water gas by passing it over a charge in horizontal retorts?

Mr. STEPHENSON, replying to the discussion, said they had four purifiers at work at South Bank for the admission of air, and they had necessarily to watch the working of these very carefully. His reason for advocating the use of a high-grade coal was that it was possible from its use to produce a larger quantity of high-grade gas, and the make per ton was proportionately increased. Thus a larger quantity of low-grade gas could be utilized, again increasing the make per ton, and also enhancing the reliability in working. So far as he knew, cookers worked very satisfactorily with low-grade gas. Perhaps the trouble mentioned by Mr. Balmforth was caused by over-exhaustion at the works. With regard to carburetted gas, this was only used in times of stress, to tide the works over a period of high demand. It was not necessary to apply a great deal of oil. Gas would be coming from the retort houses; and if only 400 gas was being made, the addition of ½ gallon of oil per 1000 c.ft. should suffice. The charge for gas in South Bank was 1s. per therm. They had no trouble in regard to deposits in gas fires. Lighting

burners were most likely to be affected. On the question of coke, they must all be alive to the fact that the coke oven people were trying hard to gain the coke market The pitch mentioned by Mr. Bateman might easily be traceable to the Tully plant. They always tried to keep this material warm, and in fluid form, and they had never had complaints of its settling. With regard to passing blue water gas over the charge in horizontal retorts, Mr. Stephenson said he had made no experiments in this matter, though he agreed that it was a question worth consideration.

Alderman J. LLOYD BOTTOMLEY, Chairman of the Brighouse Gas Committee, said that he was delighted to be able to welcome the members of the Association to Brighouse. The Mayor had fully intended to meet them, but unfortunately he had been deprived of that pleasure. He (the speaker) impressed upon his audience the necessity for continuing their research work.

Alderman G. F. SUGDEN (Chairman of the Brighouse Corporation Electricity Committee) associated himself with Alderman Bottomley's remarks. Though he was Chairman of the Electricity Committee, he felt proud of the fact that for nineteen years he had been a member of their Gas Committee, and he hoped he would be allowed to serve on that body for a similar period in the future. He felt that the gas-works of Brighouse were the most important part of the Corporation's activities from a trading point of view. To-day they were making and selling more gas than they had ever done.

Mr. C. R. INGHAM (Engineer and Manager) also welcomed the members of the Association to Brighouse.

Mr. H. L. BATEMAN (Dewsbury) proposed a vote of thanks to the Mayor and Corporation of Brighouse, the Brighouse Gas Committee, and Mr. Ingham, for the privilege of being allowed to visit their gas-works, and for the use of the Council Chamber for their meeting. Their works were in every way most modern, and in the Manager they had one of the outstanding men of the industry. He hoped the progress which Alderman Sugden had indicated would be continued.

Mr.. J. B. BALMFORTH (Bingley) seconded the resolution, which was acknowledged by Alderman Lloyd Bottomley.

### DESCRIPTION OF THE BRIGHOUSE GAS-WORKS.

The Brighouse Corporation Gas-Works are situated on the River Calder about three miles from Huddersfield and five from Halifax. The carbonizing plant consists of six beds of Drakes horizontals arranged in three beds of ten retorts 24 in. by 18 in. and 20 ft. long, and three beds of eight retorts of similar size; provision being made for converting these beds of eight into beds of ten when re-setting is done.

The greater portion of the coal is received by canal; being emptied by a steam crane belonging to the Canal Company into a small hopper in the gas-works yard. An inclined runway takes the coal from this hopper to the hopper immediately over the coal breakers. The coal handling machinery is of Drakes standard type, and the overhead conveyor is reversible, to allow coal to be fed to the overhead hoppers from the main elevator at the gable end of the retort house, or from a similar elevator in the centre of the retort house, which supplies coal from the store which is adjacent. Chutes from the overhead hoppers allow of coal being put into stock in this store as required.

A Drakes standard stoking machine is provided; the current operating this, and all the coal and coke handling machinery being supplied by a generating set comprising a 45-50 H.P. "National" gas engine direct coupled to a 30 KW. "B.T.H." dynamo. An alternative to this supply is provided by an "E.C.C." motor-generator which draws its current from the town alternating supply.

The coke is pushed out from the retorts into a Drakes electrically driven coke bus. This is operated by a 2 H.P. motor. After receiving a charge of hot coke, the bus runs to a quenching platform immediately outside the retort house. Quenching occupies one to two minutes, after which the bus runs round a 20-ft. radius curve and discharges on to an inclined bench feeding the screening plant. If it is desired to put coke into stock, the bus makes another 20-ft. radius curve, bringing it parallel with the retort house, and continues the length of the yard. Thus no labour is required in building up a stock of approximately 300 tons of coke, as the runway is about 12 ft. above yard level.

The coke screening plant consists of a continuous bucket elevator delivering on to a Drakes patent cascade screen, which divides the coke into three different sizes, which fall into separate hoppers. The large coke passes from the end of the screen on to a band conveyor equipped with a travelling throw-off carriage, which allows the large screened coke to fall into any one of four hoppers. If it is desired, coke can be by-passed over the side of the hoppers into the yard at a level of 23 ft. It is not intended to make use of this throw-off device, as the policy is never to allow the coke stock to accumulate above the 300 tons previously mentioned.

There is a long length of foul main from the retort house to the condensers, of which there are two sets—one a twin set of annular condensers, another a Holmes water-tube unit. The exhausters are of the Waller four-blade type, and there are two sets.

After passing a Livesey washer, the gas circulates through either of two Holmes washer scrubbers on the way to the purifiers. There are six purifiers, each 20 ft. square, with water lutes. The station meter is a Thorp rotary one; and this has proved very satisfactory.

There are two gasholders, one of 750,000 c.ft. capacity erected by Messrs. Clayton, Son, & Co., Ltd., in 1896, and the other one of 220,000 c.ft. capacity erected by Messrs. W. C. Holmes & Co., Ltd., in 1911.

The output of gas is approximately 200 millions per annum. Cookers, boilers, and fires are supplied on simple hire; and a large business is done in these appliances.

The domestic use of gas has developed to such an extent as to increase the output in five years from 150 millions to 200 millions, despite the falling-off of industrial consumption of about 20 millions. The whole of the street lighting is done by gas, and every lamp is clock controlled.

The sulphate plant consists of Holmes stills with Taylor saturator, and the output is at the rate of 30 cwt. per diem.

## GERMANY AND THE PATENT AND TRADE MARK PROTECTION OF THE FOREIGNER.

By Dr. HEINRICH GOLDBECK, Patent Agent and Certificated Engineer.

While the Deutsche Bürgerliche Gesetzbuch (German Civil Code, generally known as B.G.B.) and the Handelsgesetzbuch (German Commercial Code, H.G.B.) grant their protection to the nationals (private individuals and corporate bodies) of all countries, independent of their being domiciled or having a branch in Germany, and without the presupposition of reciprocity, the Patent Trade Mark and Design Acts, as well as the Unfair Competition Act, contain a special proviso under which Germany is prepared to afford to foreigners also the protection of these laws to their fullest extent—namely, when in the foreigner's own country German traders and industrials enjoy a corresponding protection.

This proviso has been rendered null and void in practically all civilized countries (up to the present 37 in number) by virtue of the Union Treaty which has in the meantime been concluded. In article 2 of this Treaty, the subjects or nationals of each of the contracting countries in all countries of the Union, with regard to patents, registered trade samples, industrial samples and designs, manufacturing or trade marks, trade names, marks of origin, and the fighting of unfair competition, are specifically promised the advantages which the laws in question grant at the present moment, or intend to grant in future to their own nationals.

The foreigner has therefore no grounds for apprehending that he will not find sufficient protection in the German Courts—as is confirmed by numerous judicial decisions. There are a fair number of so-called master-patents the proprietors of which are foreigners, and who enjoy in Germany extensive protection against infringements.

The Institute for Registered Samples (Das Institut der Gebrauchsmuster) is little known abroad, apart from Japan and Poland. Little advantage, therefore, is taken of it by foreigners. As opposed to this, lawsuits for infringement of trade marks and trade names are not rare. Thus, a short time ago, the Supreme Court of Justice in Leipzig (Reichsgericht) decided that the right of the foreigner living abroad with regard to the use of the name (Eskimo) shall be protected against infringement in Germany in the same way as is the German himself, and actually pronounced judgment against the German firm guilty of infringement.

Even when it is a question of a firm domiciled abroad, which has so far not sold its goods in Germany, it is sufficient if, according to the German point of view, such a firm has manifested its intention to run its undertaking in Germany by applying to the German Patent Office for grant of a trade mark. In this respect the point of view of the equality or similarity of the goods does not affect the question as to whether or not the same paragraph of the B.G.B. should apply. The foreign firm acting as plaintiff was, in the last cited case, especially protected by a great number of rights. The action was based on the Trade Marks Act, on the Unfair Competition Act, and on the paragraph regarding names of the German Civil Code (B.G.B.), as well as ultimately on the Union Treaty above-mentioned.

*Berlin, S.W. 61, Gitschinerstrasse 5.*

# CORRESPONDENCE.

*[We are not responsible for opinions expressed by Correspondents.]*

## Nuneaton "Gas."

SIR,—The circular published last week (p. 820) is a corollary to an article entitled "The Gas Industry and the Gas Regulation Act, 1920," published in your issue for Sept. 7 last (p. 558), in which it was shown that so far the greater latitude allowed by the new regulations in the matter of quality had not been attended with the expected cheapening of the therm. An examination of the prices of gas current on Dec. 31, 1925, proved that 500 to 560 B.Th.U. (practically the same as the old-fashioned 14 or 15 candle) gave a cheaper therm than a lower quality.

N. H. HUMPHRYS.

5, *Wyndham Road, Salisbury,*
*Dec. 22, 1927.*

## Dry Oxide Purification.

SIR,—The process of dry purification as practised at Barnoldswick, which was explained by Mr. J. W. Thompson, Engineer and Manager, in his paper read before the Manchester District Institution of Gas Engineers on Nov. 24—see "JOURNAL" for Dec. 14, p. 743—will no doubt draw a large amount of criticism during the discussion. In my own humble opinion, I venture to suggest that purification methods practised at Barnoldswick are very much out of date, for the following reasons:

1. Supervision required to rotate the boxes hourly adds to working costs.
2. The nodules of oxide placed on the grids will offer slight resistance to the gas, but they will be of little value for the extraction of $H_2S$.
3. The nodules, if broken up, will purify more effectively.
4. The greater amount of oxide that can be put into a box, having due regard to pressures, the better purifying results will be obtained, particularly if works are short of area.
5. I have found that the majority of oxides will work most effectively with 5 p.ct. of moisture.
6. There are numerous types of disintegrators on the market which deal most effectively with lumps and nodules of oxide. The current of air drawn through such a machine effectively revivifies the material, which can be returned to the boxes immediately if necessary.
7. The filling-up of the boxes with a layer of 2-in. cubes and 7 in. of fine oxide, a total of 9 in. of material, will result in higher labour costs than if a layer of 24 in. to 30 in. thick be employed. There will also be a greater tendency to creeping with thin layers of material, particularly if one layer only is employed.
8. Some prepared oxides containing 10 p.ct. of moisture will work very effectively when heated by means of a closed steam coil.
9. Oversize purifiers will naturally give low purification costs under supervision and control.
10. Capital costs of the purifiers should be taken into account when calculating purification costs, otherwise it conveys erroneous comparisons when figures are taken from works statistics.

In conclusion, I would refer Mr. Thompson to general purification methods on larger works, and also to the American practice of purification by boxes 12 ft. deep and having layers of oxide 4 ft. thick. I think the general tendency in this country during the past ten years has been the adoption of heavy layers of oxide, resulting in reduced purification costs.

T. R. COOK.

*Gas-Works, Southport,*
*Dec. 21, 1927.*

# REGISTER OF PATENTS.

## Purification.—No. 263,830.

"AMMONIA," of Vendin-le-Vieil, Lens.

No. 32,714; Dec. 24, 1926. Convention date, Jan. 4, 1926.

This invention relates to the purification, solely by means of cold water, of the gases from coal distillation or combustion, for the elimination in particular of the $CO_2$ and $H_2S$, as well as the other impurities which will form momentarily stable compounds with water, and for the subsequent generation of the water.

The process consists in the scrubbing of the gas with a large volume of cold water—for instance, 200 times the volume of the gas—operating preferably at high pressures, so as to increase the partial pressure of the $CO_2$ and the $H_2S$ in the mixture under treatment.

Subsequently to remove from the scrubbing water the $CO_2$ and the $H_2S$ which have been fixed therein, it is sought to establish a state of equilibrium between the three bodies in use, such that the $CO_2$ and $H_2S$ will be eliminated in the gaseous state.

Since the process is applicable to large volumes of gas, whereby the apparatus will utilize a large amount of water, it is desired to recover the energy employed, as far as possible. For this reason, the process comprises the recovery of over 50 p.ct. of the power in use for the pressure delivery of the scrubbing water. The pressure of this water is employed, after it has been circulated through the scrubber, in a turbine or a Pelton wheel. This arrangement offers a further advantage from the fact that the scrubbing water is well stirred up, whereby the disengagement of the combined $CO_2$ and $H_2S$ will be furthered. The disengagement of the gas is, in fact, so great that, when the water makes contact with the turbine blades, it is prudent to provide a gas stack opening to the air.

A form of apparatus is described with drawings, and covered by the claims.

## Wet Meters.—No. 280,049.

PARKINSON & COWAN (GAS METERS), LTD., of Kennington Road, S.E. 11, and THORP, F., of Stretford.

No. 31,159; Dec. 8, 1926.

The object of this invention is to provide improved means in wet gas meters for preventing the inflow or outflow of gas when the level of liquid within the measuring chamber either exceeds, or falls below, a predetermined level.

The invention comprises the combination with one stop valve of a plurality of floats and means whereby one of the floats closes the valve by its descent and the other effects such closure by its ascent.

One float is situated in a float box in direct communication with the lower part of the liquid space of the meter, and the other in communication with the lower part of the liquid space of the meter through an overflow or stand pipe. The first-mentioned float acts directly on the valve stem to close the valve by its descent, and the other acts on the valve stem through a lever to close the valve by its ascent.

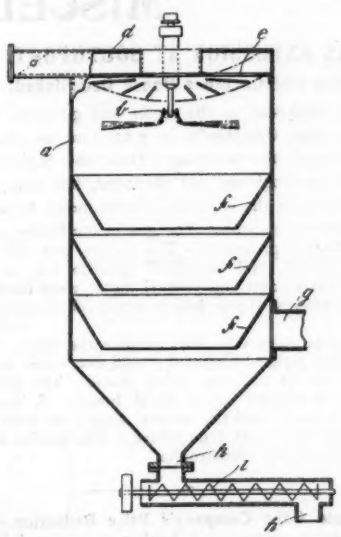
## Treatment of Gases, &c.—No. 280,268.

REAVELL, J. A., of Grosvenor Gardens, S.W. 1.

No. 19,479; Aug. 6, 1926.

This invention relates to the application of selective adsorbents such as activated charcoal, silica gel, and the like to gases, &c., for such purposes as dehydration, selective removal of bye-products, separation of gases, or removal of impurities. The invention consists essentially in spraying the adsorption agent into the upper part of a closed chamber through which the gas is caused to descend.

The adsorbing mass as a preliminary measure is ground to a state of fine division, in which condition it may be aerated by injecting into it a small quantity of the gas after the same has been subjected to the treatment. The adsorbing agent will now flow.



J. A. Reavell's Adsorber.

The apparatus illustrated comprises a cylindrical chamber *a* within which is disposed a rotary spraying device *b* (which may be of any construction capable of spraying finely divided solid materials) of a type which will spray the adsorbent body in a horizontal direction. The gas is introduced at the upper end of the vessel in such a manner that it passes downwards with a whirling motion. This may be effected by forming the upper end of the vessel *a* with a

shallow chamber *a* having radial slots *e* to deflect the gases tangentially. Any other suitable method, however, may be employed.

Toward the base of the vessel *a* are disposed a number of baffles *f*, preferably of frusto-conical form, which are attached to the wall of the chamber at their upper ends. The gas and the adsorbent agent cascade over these baffles, thus ensuring the maximum of contact between the two bodies. The base of the vessel *a* tapers downwards to an outlet *k* from which the adsorbent body separated from the gas or vapour by the action of the baffles *f* may be removed by a screw conveyor *i* into suitable receptacles. The baffles are arranged so that the lower one screens one or more outlets *g* through which the gas with the adsorbent material leaves the vessel; and such outlet may communicate, for example, with a cyclone separator which removes the powder remaining and from the top of which clean gas is discharged, while from the bottom the powder with its adsorbed gas or vapour is removed and, with the powder removed through outlet *h*, is subsequently subjected to a heating operation for the purpose of recovering the gas.

### Compressors, Exhausters, &c.—No. 280,253.

REAVELL, W., of Ipswich.

No. 12,615; May 17, 1926.

This invention refers to rotary compressors, exhausters, and engines of the crescent chamber type; and the object is to prevent the sliding blades of the rotor, when driven outwards by centrifugal force, from pressing or rubbing against the fixed casing or stator.

The invention provides that the balls or rollers carried by the blades co-operate with tracks that are themselves free to rotate upon other balls or rollers and serve to guide the blades and prevent their tips bearing against the casing, though they move in close proximity thereto. By this arrangement, the rotational velocity of the blade balls or rollers is small, as the tracks against which they bear offer such light resistance to rotation, with the result that the machines can be driven at high speeds without undue friction or wear. High efficiency can be obtained; and, in the case of compressors, the heat generated by compression may be readily dissipated by providing the casing with gills, fins, or a water jacket.

In some cases, an additional track or guide ring for the blade balls or rollers may be formed on, or attached to, the end covers so as to limit the movements of the blades inwardly or away from the track which determines the path of the blade tops when running. Such additional guide ring need not be complete, as gravity will prevent the blades moving away from the stator during their angular movement through the lower part of their path. In some cases this additional track may form part of the ball.

### Apparatus for Fixing Meter Diaphragms. No. 279,550.

SIMPSON, S., of Exmouth.

No. 18,780; July 28, 1926.

The apparatus covered by this patent is particularly suitable for fitting the bands described in specification No. 260,685 [see "JOURNAL," Vol. 176, p. 644]. It comprises two members which are relatively movable in the direction of the axis or middle of the seating for the diaphragm, one of which is of a size permitting it to rest upon and approximately to cover the seating, and the other of which is adapted to be secured to the centre or middle of the diaphragm. A third or presser member is adapted to fit around the seating and serves to press home the band or clamping ring by which the diaphragm is secured upon the seating.

The specification describes in detail and illustrates the apparatus.

### Igniting Gas by Means of a Catalyst.—No. 280,768.

HOFMANN, A., and CONRAD, E., both of Leipzig.

No. 6286; March 7, 1927.

It is already known, say the patentees, that catalysts (spongy platinum, for example) can be used with gas burners for the purpose of igniting the gas. But to ensure rapid and certain ignition the gas must be permitted to flow freely past the catalyst, and the latter must be protected from draughts as well as from the heat of the flame, once the burner is alight.

The present invention is characterized in that the catalyst is housed within a tube arranged above the burner so as to trap the escaping gas; said tube being sealed or moved away from the burner, when the latter is ignited, under the action of a thermostat. The mixture of gas and air flowing through the tube, when the gas is not ignited, completely envelops the catalyst, but the hot gases from the burning flame are not allowed to play on the catalyst, which thus fully justifies its use, particularly as it is protected against any disturbing draught.

The explosive wave set up when the mixture of gas and air is ignited is propagated in both directions through the tube, and can be used either to ignite the gas escaping at the burner, or to actuate automatically means for cutting-off the gas supply. In the one case the device serves as a gas lighter and in the other case as a safeguard against accidents arising from undetected escaping gas.

There is a detailed description of the apparatus, accompanied by drawings.

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

### Progress of Bills.

Wallasey Corporation Bill: Commons amendments considered, and agreed to.

East Hull Gas (No. 2) and Newhaven Gas Orders: Agreed to.

Barnstaple, Bath, Broadstairs, Northampton, Oldbury, and Wokingham Gas Orders: Agreed to.

## HOUSE OF COMMONS.

### Progress of Bills.

Barnstaple, Bath, Broadstairs, East Hull, Newhaven, Northampton, Oldbury, and Wokingham Gas Orders: Approved.

# MISCELLANEOUS NEWS.

## GAS EXPLOSION AT SOUTHPORT.

### Meter and Governor House Demolished.

There was an explosion in the meter and governor house of the Southport Corporation Gas-Works at 7.55 a.m. on Dec. 22, which completely demolished the building. How the explosion occurred, Mr. John Bond, the Engineer and Manager, has not yet been able to ascertain. Owing to the explosion in the meter house, the crown plates of a gasholder were split. The gas in the holder took fire, and burnt until the holder grounded. The holder was full at the time the explosion occurred, and contained 300,000 c.ft. of gas. Two ordinary station meters and one venturi meter were damaged, chiefly externally, and windows of the laboratories, offices, and stores were shattered.

Unfortunately, one man who was outside the meter house at the time was somewhat seriously injured; and one other man, working some distance away, is suffering from shock. The gas had to be shut-off from the town for about three hours. A supply was restored at about 11 a.m., and the normal supply at noon. Gas making was suspended for about four hours. The public suffered little inconvenience through the catastrophe.

**Gas Light and Coke Company's Price Reduction.**—The Directors of the Company announce a further reduction in the price of gas of two-fifths of a penny (0·4d.) per therm, or 2d. per 1000 c.ft., which will take effect as from the reading of the meter indices during the present month.

**British Tar Products, Ltd.**—At the annual meeting of the Company, a dividend of 8 p.ct. was declared on the preferred ordinary shares, and one of 5 p.ct. on the ordinary shares, both less income-tax. This dividend, together with a bonus of 5 p.ct. declared in 1926, maintains an average distribution of 10 p.ct. which the Company have made for the past five years.

## TRADE NOTES.

**Oil Engines.**

A comprehensive booklet dealing with heavy fuel oil engines has been published by Messrs. Davey, Paxman, & Co., Ltd., of Colchester. Many tables are included giving the range of sizes and guaranteed fuel consumption of various types of Paxman oil engines.

**International Cast-Iron Pipe "Ring."**

Recent publications in various papers mention that French interests are connected with an international "ring" of cast-iron pipe makers, using centrifugal patents. The Pont-à-Mousson Cast-Iron Pipe Foundries wish to make it quite clear that they have no connection or interest whatever with such a "ring."—EDMOND PETIT, General Agent for Pont-à-Mousson Foundries.

**Messrs. Brotherton & Co., Ltd.**

The announcement is made by Messrs. Brotherton & Co., Ltd., that, with a view to giving customers in Lancashire even more efficient service than hitherto, and ensuring quick dispatch of all orders, they are opening an office on Monday, Jan. 2, 1928, at 53, King Street, Manchester. The Manchester Branch, controlling local stocks of hydrosulphites, &c., will be under the management of Mr. F. T. Cutler, and with him will be associated the firm's present traveller, Mr. R. B. Penrose.

**Messrs. Ride & Bell, Ltd.**

As from the 23rd inst., the offices of Messrs. Ride & Bell, Ltd., were transferred from the works at Misterton to 26, Chapelgate, Retford, Notts. The telephone number is 180 Retford, and the telegraphic address Ridbel, Retford, Notts. This change has a two-fold purpose: First, to make it more convenient for customers to visit the firm, and secondly to provide more accommodation to cope with the continued increase in business. This change makes no difference to the association existing between the firm and Messrs. Ernest Newell & Co., Ltd., of Misterton.

# STOCK MARKET REPORT.

LONDON, *Thursday, Dec. 22.*

WHILE there was a cheerful tendency on the Stock Exchange last week, the close approach of Christmas naturally brought about a reduction in the number of transactions. The public were shy of the £7,000,000 New South Wales 5½ p.ct. loan offered at 99½, and the underwriters were left with 62 p.ct. of the issue, the scrip being quoted at a discount.

There was still some animation in Industrials. Home Rails made further progress on the prospect of more satisfactory accounts for the year; and a number of gilt-edged stocks and foreign bonds were prominent. In the gilt-edged section, War Loan, Victory Bonds, and Funding Loan showed small advances; and one or two Indian issues and the new scrips—Australian 5 p.ct., and South African 5 p.ct.—also improved.

Among the Industrials, Mond Nickels, Celanese, Imperial Chemicals, and Tobaccos also hardened. The losses sustained by the Standard and Rover Companies caused some anxiety with regard to shares in that market, and Triplex Glass also reacted after their rather surprising jump.

Prices in the Gas Market continue to improve, and any stock available is speedily absorbed. It will be noticed that the stock quotations of five companies were marked up. Tottenham "A" and "B" and Hornsey 3½ p.ct. rose 2 points each; Croydon maximum and Montevideo 1 point; and Gas Light and Coke again improved slightly. With the further reduction in the price of gas as from Christmas, the latter Company are selling at 8·6d. per therm, and the statutory rate of dividend at this price for the next year will, after providing for the Redemption Fund contribution, be £5 12s. p.ct. per annum.

The following transactions were recorded last week:

On Monday, Aldershot 4 p.ct. preference 70½, Gas Light and Coke 88⅞, 89, 89⅛, 89¼ 89⅜, 4 p.ct. preference 77⅜, Imperial Continental 143, 144, 144½, Primitiva 19s. 7½d., South Metropolitan 103½, 103⅝, 3 p.ct. debenture 60¾. Supplementary prices, Brighton and Hove 5 p.ct. debenture 95, Herne Bay 6¼ p.ct. preference 5¼.

On Tuesday, Brighton and Hove 6 p.ct. 110, 5 p.ct. 98½, Croydon maximum dividend 83½, European 7⅞, Gas Light and Coke 88⅞, 89½, 89⅛, 89⅝, 89¾, 90, 3 p.ct. debenture 60½, 61¼, 5 p.ct. debenture 100⅜, Imperial Continental 144, 145, 145¼, Montevideo 91, Oriental 110, Primitiva 19s., 19s. 1½d., 19s. 3d., 19s. 4½d., 19s. 6d., South Metropolitan 3 p.ct. debenture 60¾, 61, 6½ p.ct. debenture 103½, Uxbridge 5 p.ct. preference 87. Supplementary prices, Exeter 5 p.ct. debenture 97.

On Wednesday, Brighton and Hove 6 p.ct. 111, Gas Light and Coke 90, 90⅛, 90⅝, 91, 91½, 4 p.ct. preference 77¾, Primitiva 19s., 19s. 1½d., 19s. 3d., Wandsworth new ordinary 97½. Supplementary prices, Romford "B" 7 p.ct. 8¼.

In Lombard Street there was a brisk demand for money early in the week. Balance-sheet withdrawals were moderate; but the short loan market was affected by Christmas currency demands. Old day-to-day loans were renewed at from 4 to 3½ p.ct., and new money was available at the lower figure. Discount quotations were firm, the changes in the quotations being very slight. New Treasury Bills were sold at 4 9/32 p.ct.

On the Foreign Exchange Market, the dollar-sterling was steady, the rate generally being 4.88 9/32. The Spanish exchange, however, fluctuated widely, at one time rising to 29.52, being 10 or more points above the lowest price. Continental exchanges showed little variation. Belgas were slightly cheaper, and Italian lire in demand. Swiss francs showed a sharp rise against sterling.

There was very little demand for Gold, and the price fell to 84s. 10d. per oz. Silver also cheapened. China was selling, and the cash price was quoted at 26 7/16d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. Bankers' deposit rates are 2½ p.ct. The deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

| Issue. | Share. | When ex-Dividend. | Dividends. Prev. Hf.Yr | Dividends. Last Hf. Yr. | NAME. | Quotations. Dec. 22. | Rise or Fall on Week. | Transactions. Lowest and Highest Prices. |
|---|---|---|---|---|---|---|---|---|
| £ | | | %p.a | % p.a. | | | | |
| 171,978 | Stk. | Sept. 8 | 5 | 5 | Aldershot 5 p.c. max. C. | 68—73 | .. | .. |
| 222,992 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. | 69—72 | .. | 70½ |
| 1,551,868 | ,, | Sept. 29 | 7 | 7 | Alliance & Dublin Ord. | 90—94 | .. | .. |
| 374,000 | ,, | July 14 | 4 | 4 | Do. 4 p.c. Deb. | 64—67 | .. | .. |
| 532,654 | ,, | Aug. 25 | — | 7 | Barnet Ord. 7 p.c. | 105—108 | .. | .. |
| 300,000 | 1 | Oct. 13 | 1/7½ | 1/7½ | Bombay, Ltd. | 21/6—23/6 | .. | .. |
| 170,000 | 10 | Aug. 25 | 8½ | 8½ | Bournemouth 5 p.c. | 12½—13½ | .. | .. |
| 600,050 | 10 | ,, | 7 | 7 | Do. B 7 p.c. | 12—12½ | .. | .. |
| 275,000 | 10 | ,, | 6 | 6 | Do. Pref. 6 p.c. | 10¾—11½ | .. | .. |
| 50,000 | Stk. | June 29 | 3 | 3 | Do. 3 p.c. Deb. | 55—58 | .. | .. |
| 162,025 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. | 75—78 | .. | .. |
| 257,900 | ,, | Aug. 25 | — | 7½ | Brighton & Hove 6 p.c. Con. | 109—111 | .. | 110—111 |
| 341,800 | ,, | ,, | — | 6/8/6½ | Do. 5 p.c. Con. | 98—101 | .. | 98½ |
| 1,327,500 | ,, | July 28 | 5 | 5 | Bristol 5 p.c. max. | 87—88a | .. | .. |
| 885,000 | ,, | Sept 29 | 7 | 8 | British Ord. | 109—112 | .. | .. |
| 100,000 | ,, | June 29 | 7 | 7 | Do. 7 p.c. Pref. | 114—117 | .. | .. |
| 120,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. | 74—77 | .. | .. |
| 200,000 | ,, | ,, | — | 33/2 | Do. 5 p.c. Red. Deb. | 95—98 | .. | .. |
| 100,000 | 10 | Nov. 24 | 8 | 6 | Cape Town, Ltd. | 7—8 | .. | .. |
| 100,000 | 10 | Oct 27 | 4½ | 4½ | Do. 4½ p.c. Pref. | 6—7 | .. | .. |
| 150,000 | Stk. | June 29 | 4½ | 4½ | Do. 4½ p.c. Deb. | 70—75 | .. | .. |
| 626,860 | ,, | July 28 | 6 | 6 | Cardiff Con. Ord. | 100—103 | .. | .. |
| 237,860 | ,, | June 29 | 7½ | 7½ | Do. 7½ p.c. Red. Deb. | 103—106 | .. | .. |
| 157,150 | ,, | Aug. 11 | 6¼ | 5 | Chester 5 p.c. Ord. | 87—92b | .. | .. |
| 79,185 | 1 | Oct. 13 | 12/- | 12/- | Colombo Ltd. Ord. | 31/—33/- | .. | .. |
| 24,495 | 1 | ,, | 1/11 | 1/11 | Do. 7 p.c. Pref. | 20/—22/- | .. | .. |
| 521,490 | 1 | Oct. 13 | 1/9½ | 1/9½ | Colonial Gas Assn. Ld. Ord. | 24/—26/- | .. | .. |
| 173,900 | 1 | ,, | 1/7½ | 1/7½ | Do. 8 p.c. Pref. | 20/—22/- | .. | .. |
| 2,073,280 | Stk. | July 14 | — | 5 | Commercial Ord. | 93—95 | .. | .. |
| 475,000 | ,, | June 16 | 3 | 3 | Do 3 p.c. Deb. | 56—59 | .. | .. |
| 800,000 | ,, | Sept. 29 | 11 | 11 | Continental Union, Ltd. | 28—33 | .. | .. |
| 200,000 | ,, | ,, | 7 | 7 | Do. 7 p.c. Pref. | 87—92 | .. | .. |
| 787,580 | ,, | Aug. 11 | 6½ | 6½ | Croydon sliding scale | 94—101 | .. | .. |
| 403,100 | ,, | ,, | 5 | 5 | Do. max. div. | 81—84 | +1 | 83½ |
| 422,270 | ,, | Aug. 25 | 9 | 6 | Derby Con. | 103—105e | .. | .. |
| 55,000 | ,, | June 29 | 4 | 4 | Do. Deb. | 73—75e | .. | .. |
| 209,000 | ,, | Aug. 25 | 5 | 5 | East Hull Ord. 5 p.c. | 78—81 | .. | .. |
| 50,000 | ,, | June 16 | 5 | 5 | Eastbourne 5 p.c. Deb. | 90—95 | .. | .. |
| 1,002,180 | 10 | Sept. 29 | 13 | 14 | European, Ltd. | 7⅞—8½ | .. | 7⅞ |
| 8,747,460 | Stk. | July 28 | 5 | 5 | Gas Light & Coke 4 p.c. Ord. | 88¼—90½ | +½ | 88⅞—91½ |
| 2,600,000 | ,, | ,, | 8½ | 8½ | Do. 8½ p.c. max. | 62—64 | .. | .. |
| 4,157,020 | ,, | ,, | 4 | 4 | Do. 4 p.c. Con. Pref. | 76—79 | .. | 77⅜ |
| 5,602,620 | ,, | June 16 | 8 | 8 | Do. 8 p.c. Con. Deb. | 60—62 | .. | 60½—61¼ |
| 181,315 | ,, | ,, | 6 | 6 | Do. 6 p.c. Br'tf'd Rd. Db. | 102—105 | .. | .. |
| 1,642,770 | ,, | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. | 99—101 | .. | 100⅜ |
| 42,000 | ,, | — | 7½ | 7½ | Do. 7½ p.c. Ilford Deb. | .. | .. | .. |
| 82,500 | ,, | Aug. 25 | 6½ | 6½ | Hastings & St L. 5 p.c. Conv | 89—91 | .. | .. |
| 268,740 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. Conv. | 73—75 | .. | .. |
| 70,000 | 10 | Oct. 13 | 110 | 110 | Hongkong & China, Ltd. | 12—13 | .. | .. |
| 173,200 | Stk. | Aug. 25 | 5 | 5 | Hornsey Con. 3½ p.c. | 75—78 | +2 | .. |
| 1,976,000 | ,, | Nov. 10 | 10 | 10 | Imperial Continental Cap. | 143—146 | .. | 143—145½ |
| 223,180 | ,, | Aug. 11 | 8½ | 8½ | Do. 8½ p.c. Red. Deb. | 68—70 | .. | .. |
| 235,242 | ,, | Aug. 11 | 6½ | 7 | Lea Bridge 5 p.c. Ord. | 96 99 | .. | .. |
| 2,145,907 | ,, | Aug. 11 | 6½ | 6½ | Liverpool 5 p.c. Ord. | 88—89b | .. | .. |
| 600,000 | ,, | Sept. 29 | 7 | 7 | Do. 7 p.c. Red. Pref. | 103—105b | .. | .. |
| 165,786 | ,, | Aug. 25 | 8 | 9 | Maidstone 5 p.c. Cap. | 107—112 | .. | .. |
| 75,000 | 6 | June 16 | 17 | 18 | Malta & Mediterranean | 5½—6 | .. | .. |
| 541,920 | Stk. | Nov. 24 | 17 | 15 | Montevideo, Ltd. | 90—94 | +1 | 91 |
| 2,061,315 | ,, | July 28 | 5 | 5 | Newcastle & Gateshead Con. | 77⅞—78½d | .. | .. |
| 360,929 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. | 67½—67½d | .. | .. |
| 691,705 | ,, | June 29 | 8½ | 8½ | Do. 8½ p.c. Deb. | 66½—67½d | .. | .. |
| 131,785 | ,, | Aug. 25 | — | 5/8 9 | North Middlesex 5 p.c. Con | 93—96 | .. | .. |
| 300,000 | ,, | Nov. 24 | 7 | 9 | Oriental, Ltd. | 105 110 | .. | 1.0 |
| 188,120 | ,, | June 21 | 7½ | 7½ | Plym'th & Stonehouse 5 p.c. | 105—110 | .. | .. |
| 414,500 | ,, | Aug. 25 | 7½ | 7½ | Portsm'th Con. Stk 4 p.c. Std. | 102—105 | .. | .. |
| 286,732 | ,, | ,, | 5 | 5 | Do. 5 p.c. max. | 76—79 | .. | .. |
| 2,289,909 | 1 | — | — | — | Primitiva Ord. | 19/—20/- | .. | 19/—19/7½ |
| 282,200 | 100 | Dec. 1 | 4 | 4 | Do. 4 p.c. Red. Deb. | 86—89 | .. | .. |
| 600,000 | Stk. | July 28 | 4 | 4 | Do. 4 p.c. Red. Deb 1911 | 73—75 | .. | .. |
| 434,963 | ,, | June 29 | — | 4 | Do. 4 p.c. Cons. Deb. | 73—75 | .. | .. |
| 160,000 | 10 | Sept. 29 | 6 | 6 | San Paulo 6 p.c. Pref. | 8½—8¾ | .. | .. |
| 125,000 | 50 | June 29 | 5 | 5 | Do. 5 p.c. Red. Deb. | 47—49 | .. | .. |
| 270,000 | Stk. | Sept. 8 | 5½ | 5½ | Sheffield A | 102—104e | .. | .. |
| 413,948 | ,, | ,, | 5½ | 5½ | Do. B | 102—104e | .. | .. |
| 1,017,000 | ,, | ,, | 5½ | 5½ | Do. C | 102—104e | .. | .. |
| 90,000 | 10 | May 26 | 4 | 6 | South African | 4—6 | .. | .. |
| 6,609,895 | Stk. | Aug. 11 | 7 | 5 | South Met. Ord. | 102 104 | .. | 103½—103½ |
| 500,000 | ,, | — | — | — | Do. 6 p.c. Irred. Pf. | 110—113 | .. | .. |
| 1,895,445 | ,, | July 14 | 8 | 8 | Do. 8 p.c. Deb. | 59—62 | .. | 60¾—61 |
| 734,000 | ,, | Sept 8 | 6½ | 6½ | Do. 6½ p.c. Red. Db. | 102—104 | .. | 103½ |
| 91,600 | ,, | Aug. 11 | 8½ | 8½ | South Shields Con. | 101—103d | .. | .. |
| 1,243,796 | ,, | July 28 | 6½ | 6½ | South Suburban Ord. 6 p.c. | 102—105 | .. | .. |
| 368,887 | ,, | June 16 | 6 | 6 | Do. 6 p.c. Deb. | 93 96 | .. | .. |
| 647,740 | ,, | Sept. 8 | 5 | 5 | South'mpton Ord. 5 p.c. max | 75—78 | .. | .. |
| 1,1.1,275 | ,, | June 29 | 4 | 4 | Do. 4 p.c. Deb. | 78 76 | .. | .. |
| 950,000 | ,, | Aug. 25 | 7 | 7 | Swansea 7 p.c. Red. Pref. | 103—106 | .. | .. |
| 300,000 | ,, | June 16 | 6½ | 6½ | Do. 6½ p.c. Red. Deb. | 100—103 | .. | .. |
| 120,000 | ,, | July 28 | 7½ | 7½ | Tottenham District A 5 p.c. | 107—110 | +2 | .. |
| 892,276 | ,, | ,, | 6½ | 6½ | Do. B 3½ p.c. | 91—94 | +2 | .. |
| 160,000 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. Pref. | 97—100 | .. | .. |
| 161,255 | ,, | Dec. 8 | 4 | 4 | Do. 4 p.c. Deb. | 74—77 | +1 | .. |
| 2.3,251 | ,, | Sept. 29 | 5 | 5 | Tynemouth Con. and New Uxbridge, Maidenhead, & | 81 83d | .. | .. |
| 2?3,094 | ,, | Aug 25 | 6½ | 6½ | Wycombe 5 p.c. | 85—90 | .. | .. |
| 28,880 | ,, | ,, | 5 | 5 | Do. 5 p.c. pref. | 88—88 | .. | 87 |
| | | | | | Wandsworth, Wimbledon, and Epsom— | | | |
| 3?,000 | ,, | July 14 | 8½ | 8½ | Wandsworth A 5 p.c. | 125—130 | .. | .. |
| 265,686 | ,, | ,, | 7 | 7 | Do. B 8½ p.c. | 105—110 | .. | .. |
| 432,585 | ,, | ,, | 5/19/0 | 5/19/0 | Do. C and New | 90—95 | .. | 97½ |
| 852,000 | ,, | ,, | 6⅝ | 6⅝ | Do. Wimbledon 5 p.c. | 100—105 | .. | .. |
| 58,000 | ,, | ,, | 7½ | 7½ | Do. Epsom 5 p.c. | 107—112 | .. | .. |
| 200,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref | 85—90 | .. | .. |
| 48,416 | ,, | June 29 | 3 | 3 | Do. 3 p.c. Deb. | 56—59 | .. | .. |
| 284,743 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. | 74—77 | .. | .. |

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div. † Paid free of income-tax. ‡ For year.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## LIGHT AND HEAT IN HYGIENE.

During the four days Dec. 13 to Dec. 16, the Central Hall, Westminster, was the scene of the first international conference and exhibition relating to light and heat in medicine, surgery, and hygiene. At the conference medical and scientific men discussed a number of questions arising out of the new methods of healing which have for their basis the use of light rays, ultra-violet rays, heat rays, and X-rays. Exhibition space was devoted to a comprehensive display of heat, light, and ultra-violet ("artificial sunlight") lamps, and certain drugs and preparations which are now used conjointly with the rays. The programme included a paper by Prof. Leonard Hill, F.R.S., Director of the Department of Applied Physiology at the Medical Research Council's laboratory at Mount Vernon, on "The Ultra-Violet in Sunlight and Artificial Light Sources." The exhibition and conference were organized by the "British Journal of Actinotherapy."

### RADIATION, LTD.

The progress in both gas fire and gas cooker design was demonstrated by means of a practical display by Radiation, Ltd., at whose stand it was explained that heating by radiant energy possesses definite advantages over alternative methods when provided by convected heat. The energy emitted in the visible portion of the spectrum and in the near infra-red has a definite stimulative value—a fact recognized by those who have done research work on the subject. It is possible to increase the percentage of energy available in this region; and special attention has been paid to the attainment of this desirable result in the development of the gas fires shown. The hygienic efficiency of gas grates constructed on the injector-ventilator principle was also emphasized. Attention was also drawn to the newest style of Radiation cooker, with "Regulo" automatic heat control, single oven burner, and direct bottom flue outlet.

### "VITA" GLASS.

Another display was in connection with "Vita" glass, the qualities of which have already been pointed out to "JOURNAL" readers. This glass is the result of the scientific work of Mr. F. E. Lamplough, M.A., formerly Fellow of Trinity College, Cambridge, and for some years Research Director of Messrs. Chance Bros. & Co., Ltd., of Smethwick and Glasgow—the sole manufacturers of the glass. "Vita" glass transmits radiation to the furthest limits of the sun's spectrum, and somewhat beyond. This is proved by spectrum photographs, which have been tested and corroborated by independent authorities. About 4 p.ct. more of visible light is also transmitted through "Vita" glass than through ordinary window glass. Furthermore, a considerable additional amount of infra-red or heat rays is transmitted, which renders a room glazed with this glass much warmer. Apart from its unique transparency to the curative ultra-violet rays, "Vita" glass is much harder than ordinary glass, and of greater tensile strength, owing to the high percentage of quartz in its composition. This enables larger panes to be used for roof-glazing than would be possible with ordinary glass of similar thickness. It will also stand a temperature 50° C. higher than ordinary glass.

### "VITREOSIL."

A good selection of chemical and other laboratory ware and apparatus was to be seen on the stand of the Thermal Syndicate, Ltd., of Wallsend-on-Tyne, who specialize in "Vitreosil."

## DIARIES, CALENDARS, &c.

The diaries and calendars which we are, as usual, receiving at this season of the year are of an exceptionally excellent order.

A neatly bound diary has arrived from the Stanton Ironworks Company, Ltd., Stanton-by-Dale, near Nottingham. It contains a considerable amount of information of great value for day-by-day reference by all engaged in the distribution of gas or water.

A useful pocket case is from the Staveley Coal and Iron Company, Ltd., of Chesterfield. It contains a diary and useful information separately bound. The diary is of an ample order, while the useful information section is packed with all sorts of data useful to distributing engineers. References to the Company's ammonia, coal tar, and other chemical products are included.

The Gas-Meter Company have sent us an attractive pocket diary in small compass. The front pages present useful material to those who have to deal with meters and gas sales, as well as general information which every private individual and business man often require. A number of lettered pages at the end enables the owner to make memoranda easy for reference.

A desk calendar, well illustrated, has been received from A. Borsig, of Tegel. The illustrations refer to the vast range of productions of the firm—locomotives of all kinds, steam plant, pumps for many purposes, air compressors, refrigerating plant, plant for the petroleum industry, apparatus for research work, &c.

From Messrs. Newton, Chambers, & Co., Ltd., we have received an excellent wall calendar with affixed a block of dates in large type, which will be visible from any point in a spacious room.

Messrs. Brotherton & Co., Ltd., of Leeds, have sent a refill calendar for 1928. At the bottom of each page appears a quotation which is worth remembering. The compilation is by Dorothy Una Ratcliffe (Mrs. Charles Ratcliffe).

With their compliments, the Anglo-Scottish Chemical Company, Ltd., forward a useful "Blythswood New Ring" tablet diary, which gives instant reference to past and present jottings for appointments through fifteen months.

The "Chemical Trade Journal" have also favoured us with a copy of their wall calendar.

## CONTRACTS OPEN.

**Coal.**

The County Borough of Wallasey invite tenders for the supply of gas coal. [See advert. on p. 893.]

**Reduction in Price at Wellington.**—The Wellington (Salop) Gas Company announce that the price of gas will be reduced by 0·45d. per therm (2d. per 1000 c.ft.), commencing with the first quarter of 1928.

**Record Output at Birmingham.**—The volume of gas distributed during the week which ended on Saturday, Dec. 17, was the largest in the history of the Birmingham undertaking. The total was nearly 370 million c.ft.

**Gas Fatalities.**—As the result of escape of gas, believed to have been the sequel to the breaking of pipes during the thaw, Mr. and Mrs. Charles Bristow, an elderly couple, were found dead at Graveney Road, Tooting, last week; and at Newtown (Montgomeryshire) three persons were poisoned.

**Irish Gas Prices.**—At Coleraine the price of gas has been reduced from 4s. 2d. to 3s. 9d. per 1000 c.ft., with the prospect of a further reduction at an early date. In Portadown, a reduction has been made of 10d., to 5s. 5d.; and in Keady (co. Armagh), from 10s. to 8s. 4d. per 1000 c.ft.

**The Province of Buenos Aires Gas** has been registered as a private Company, with a capital of £10,000 in £1 shares, to acquire assets in the Argentine Republic (including goodwill) of the South Barracas (Buenos Aires) Gas and Coke Company, &c. Registered Office: 227, Dashwood House, 69, Old Broad Street, E.C. 2.

**Lower Charges at Bridgnorth.**—The Bridgnorth Town Council have decided to make a further reduction in the price of gas of 6d. per 1000 c.ft. from the December readings of the meters. This reduction followed a like reduction which took effect in March, and the net price of gas will be 3s. 6d. per 1000 c.ft. after Christmas.

**Theft of Gas.**—At Rotherham, on Dec. 13, Edward W. Miller, a Maltby garage proprietor, was summoned for stealing 1000 c.ft. of gas, valued at 5s., from the Maltby and Bramley Gas Company, and for having unlawfully connected a pipe. The Bench fined defendant £5 for having connected the pipe, and £2 for the theft of gas.

**Geyser Tragedy.**—A verdict of "Accidental death by carbon monoxide poisoning" was returned at the inquest on a boy named Jones which was held by the North Caernarvonshire Coroner, Mr. Pentir Williams, on Dec. 8. Death was caused by a geyser fitted in a small bathroom and having no flue for the escape of products of combustion.

**Metropolitan Gas Meters, Ltd.**—At the annual meeting on Dec. 14, it was stated that the profit and loss account for the year ended Sept. 30 showed a profit of £9478, which, with the amount brought forward from the previous year—namely, £2413—less £3000 written off goodwill and patents, left an available balance of £8891. The Directors reported that the demand for the Company's manufactures, and the output from the works, had shown continuous improvement throughout the year. A dividend of 10 p.ct. (less tax) was declared, leaving £3934 to be carried forward, subject to Directors' and Managing Director's extra remuneration.

**The Plassmann Low-Temperature Process.**—At the annual meeting of the Leeds Fireclay Company, Ltd., Mr. C. F. Spencer, the Chairman, mentioned that the Company had acquired the exclusive British rights of the Plassmann process for the low-temperature carbonization of coal. This, said Mr. Spencer, is a continuous and automatic process which without briquetting will produce a smokeless fuel in large firm lumps from coal slacks or fines. The tar or crude oil produced is of remarkable purity, and can be used without further treatment as fuel oil for boiler firing or Diesel engines. Labour operating costs are reduced to what appears to be a minimum.

**Delegation to Inspect Waterless Holder.**—The proposal of the Clitheroe Gas Committee to send a delegation to Staines to inspect the waterless gasholder in ccurse of erection was the subject of a lively discussion at a meeting of the Clitheroe Town Council. Opposing, Councillor Satterthwaite said the Committee seemed determined to commit themselves to the erection of a new holder, though the need had not been established. Councillor Parker claimed that it had been abundantly demonstrated that new storage was required. Complaints were constantly being made as to the unsatisfactory pressure. Apart from this, it was ridiculous to spend thousands of pounds in reorganizing and modernizing the production plant unless they were to provide storage for the bigger output. The resolution appointing a delegation was carried by seven votes to six.

**Dunfermline Gas Decrease.**—Reference to the heavy decrease in gas consumption owing to the closing of Rosyth Dockyard was made by Bailie Smith, Convener of the Gas Committee, at a meeting of the Dunfermline Town Council. Prior to the Government's decision to close the dockyard becoming known, said Bailie Smith, the Gas Department had launched a scheme to erect more retorts at a cost of £27,000. The figures for the half-year proved that the expenditure of £27,000 could have been saved, or at least delayed for a few years. Comparing the half-year ended Nov. 15 with the corresponding half-year in 1925, because the coal strike last year led to an abnormal demand for gas, Bailie Smith said there was a decrease for the last six months of 6½ million c.ft. There was a decrease in the Rosyth district and the dockyard of 7½ million c.ft., so that in the Dunfermline and other districts there was an increase of 1 million c.ft.

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# GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXXX. No. 3371.] LONDON, DECEMBER 28, 1927. [79TH YEAR. PRICE 1s.



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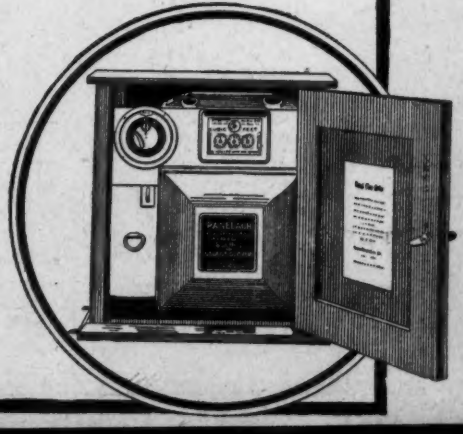

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LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

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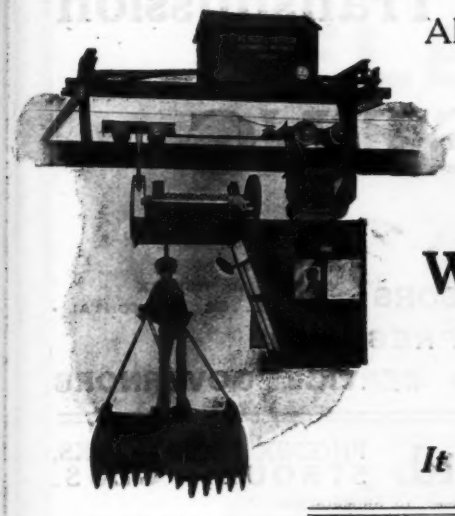

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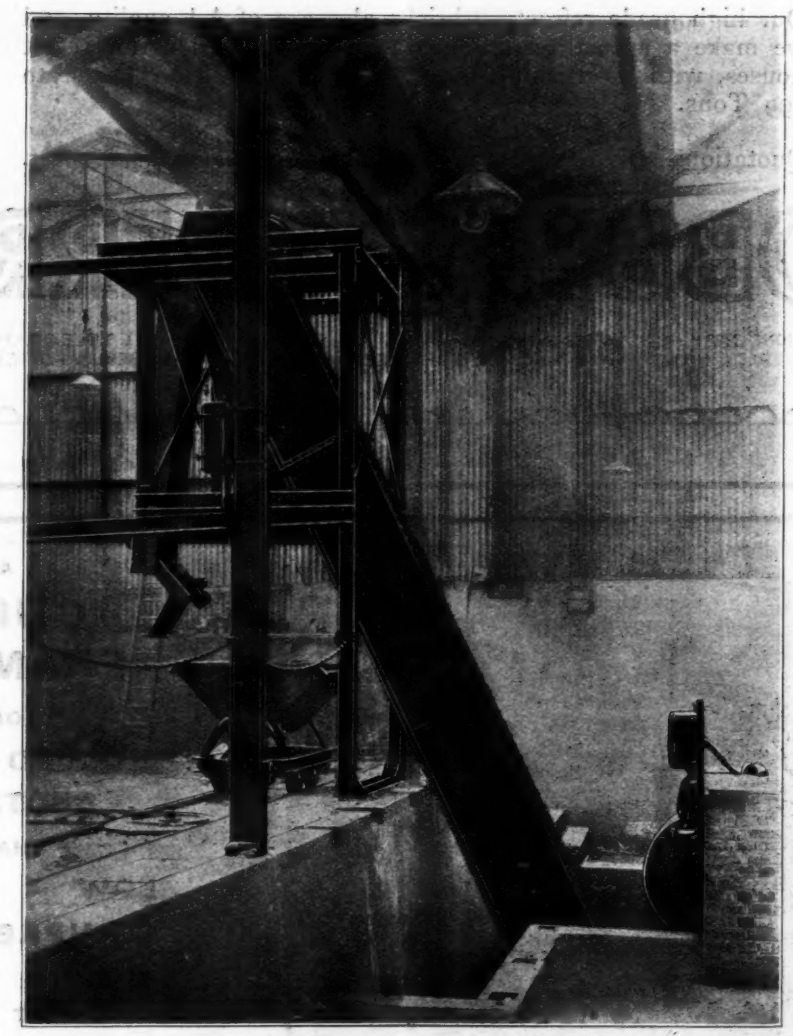

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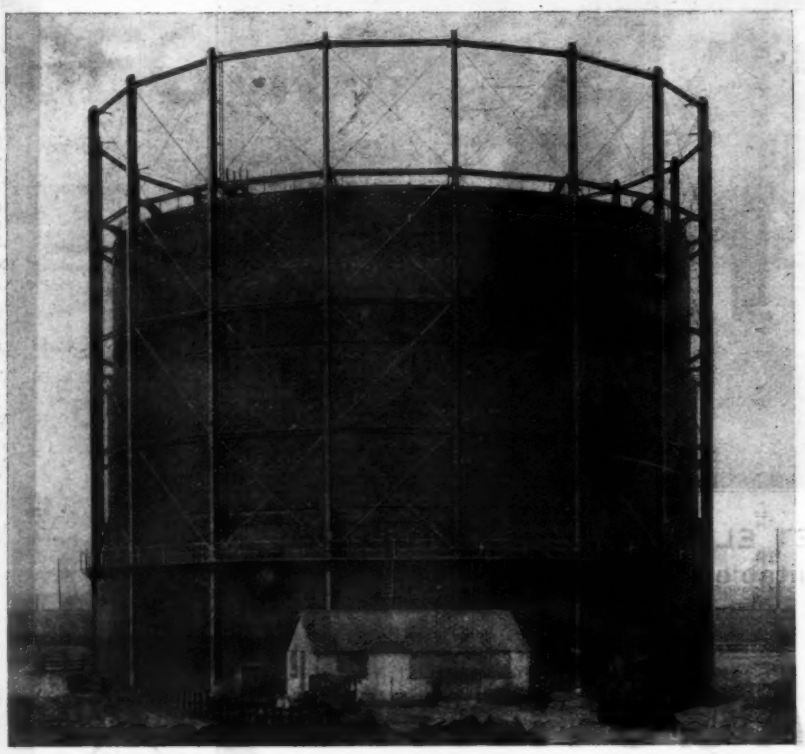

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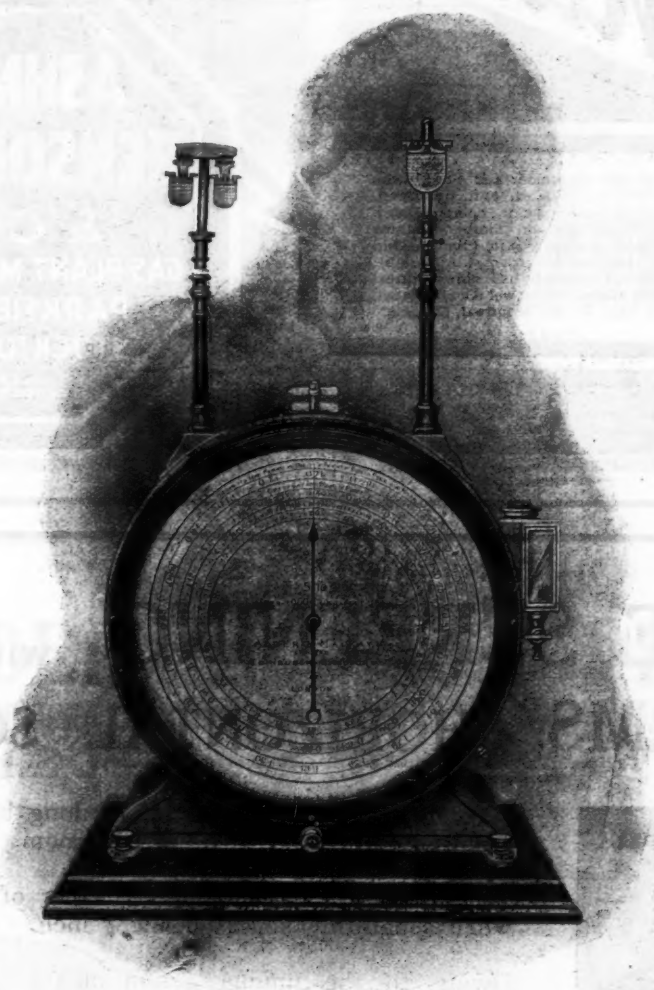

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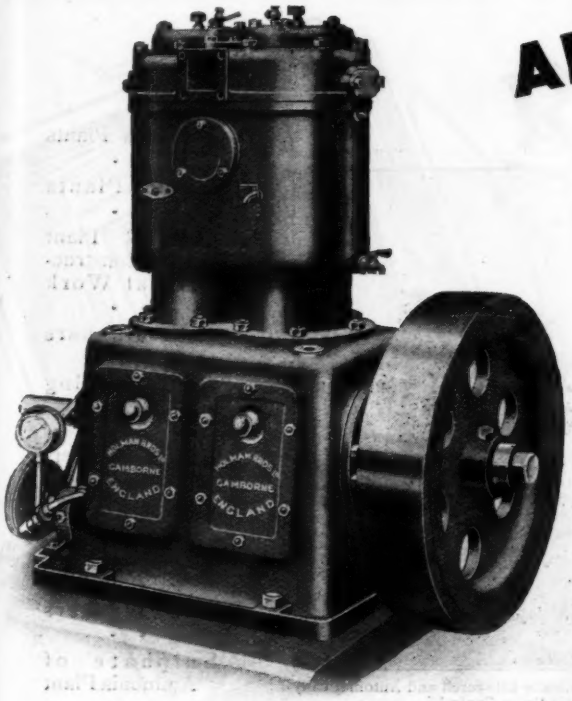

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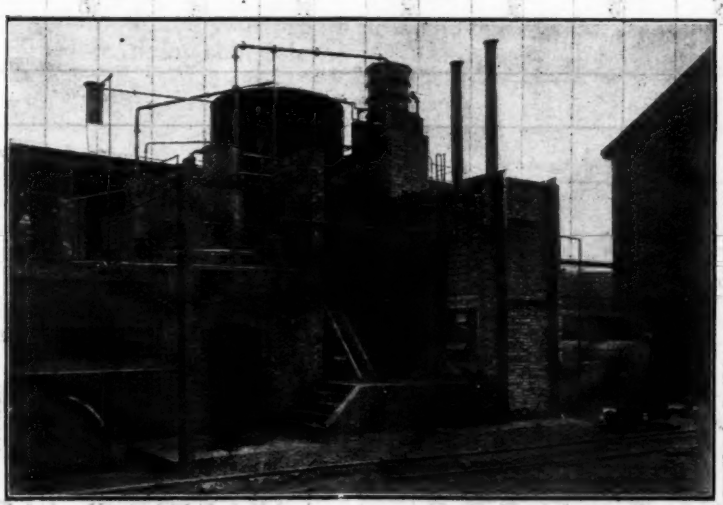

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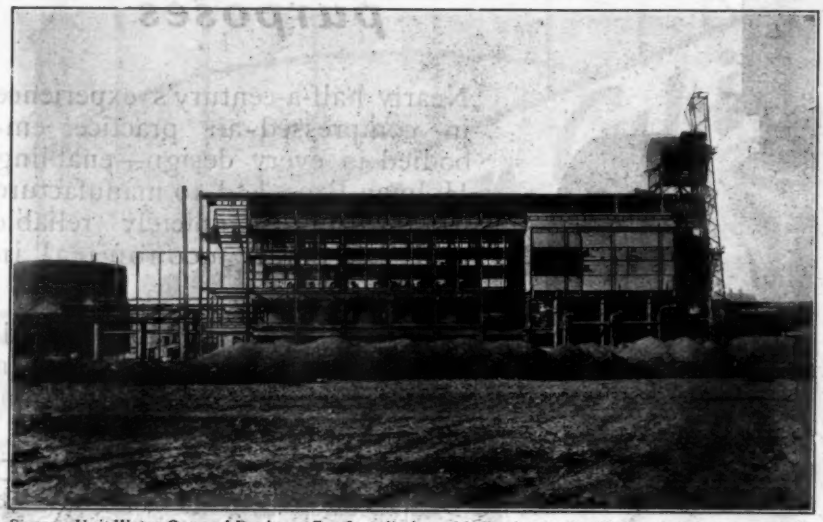

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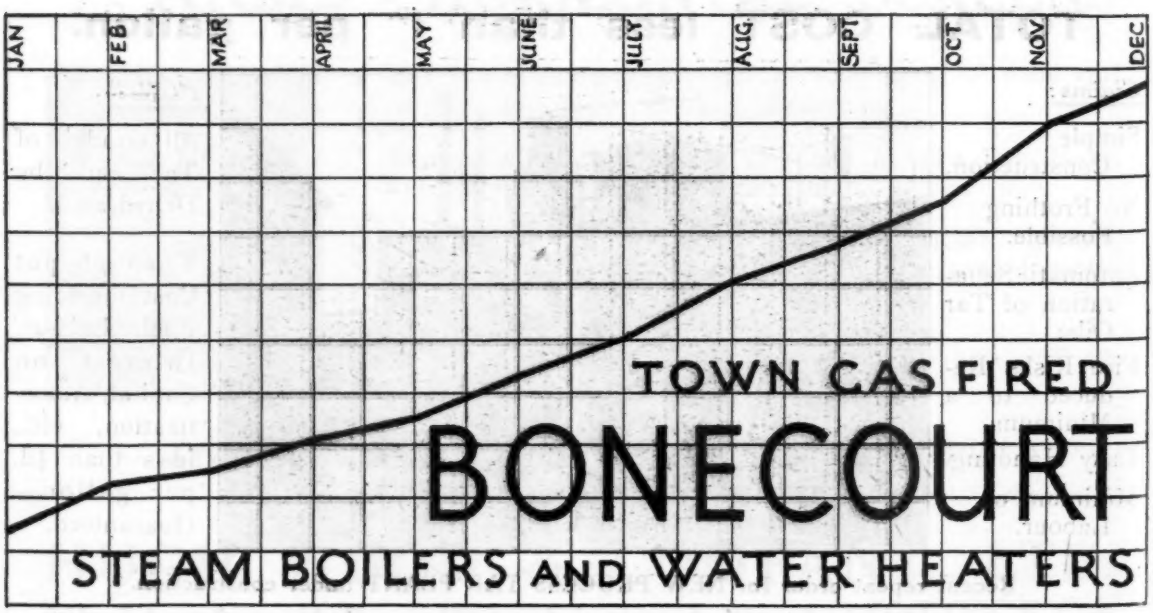


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# READY for Big Sales!

There is a tremendous demand for "Sunbeams" and sales give promise of early surpassing last year's high figures.

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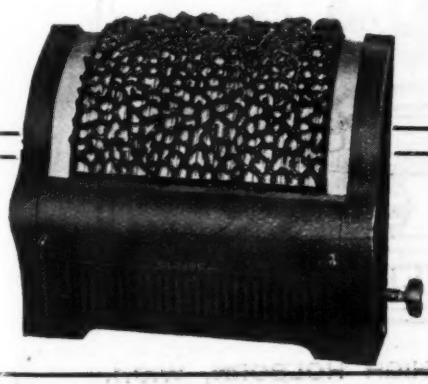

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# EFFICIENT STEAM PLANT FOR GAS WORKS.

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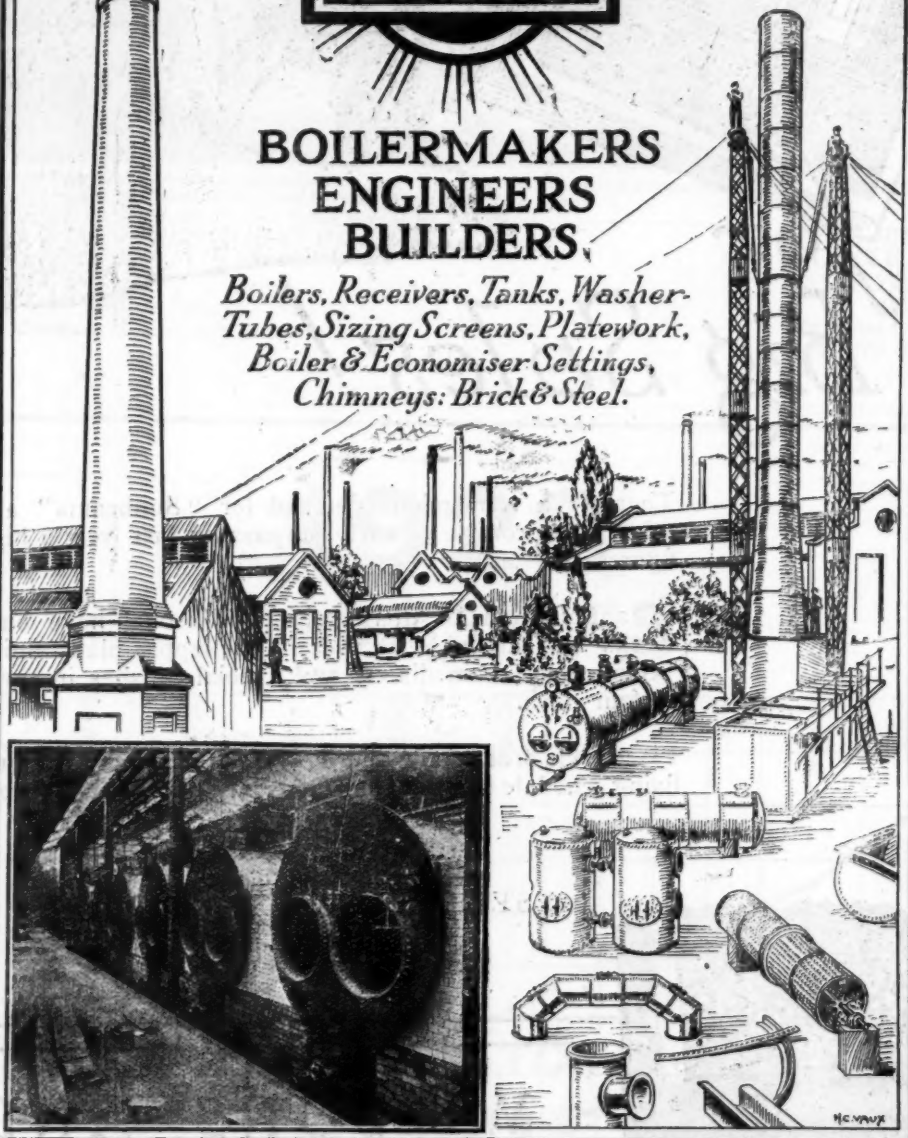



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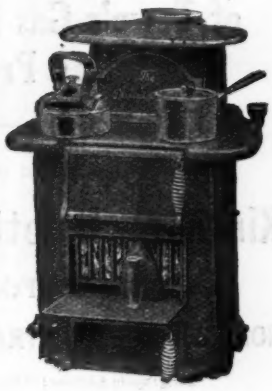
## HOT WATER SUPPLY

For fixing in conjunction with a gas stove to replace the old-fashioned range.

*The* **DOMESTIKĀTUM**

is the ideal boiler for this purpose, as it provides the cheerful open fire to which the housewife is accustomed, whilst supplying plentiful hot water for domestic use.

With Stand.



Without Stand.

FULL PARTICULARS AND LISTS FROM

**JONES & ATTWOOD, Ltd.,**
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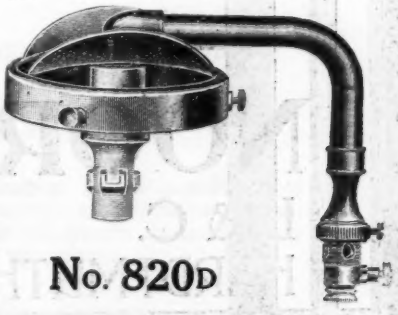
# BRAY BURNERS

## SWAN NECK TYPE

The burner illustrated is made out of robust materials. The globe-holder and deflector are of heavy aluminium, and all brass parts are made from solid bar or solid drawn tubing. It is fitted with the Bray Patent Diffuser.



**No. 820D**

NO LIGHTING BACK NO POTS TO BREAK

NO GAUZE TO CHOKE UP

BURNS QUIETLY KEEPS CLEAN

PARTICULARS OF THIS AND OTHER MODERN BURNERS ARE GIVEN IN CATALOGUE No. 137. PLEASE APPLY FOR A COPY TO

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"THE GLYCERIN"

GAS DRYING PROCESS.

*MAXIMUM DRYING*
*WITH*
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75°/₀ Reduction in the Humidity of Town's Gas is obtained by this Process.

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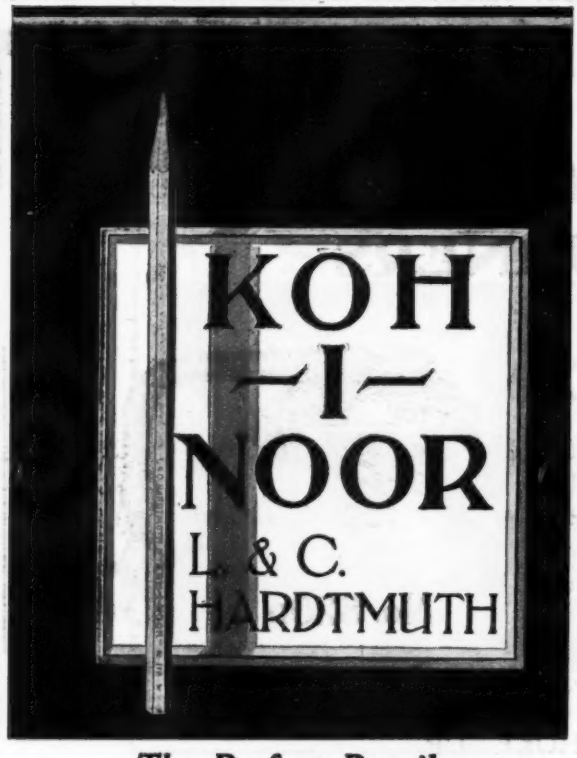


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Each of its 17 degrees is absolutely uniform, and each pencil uniform from beginning to end.

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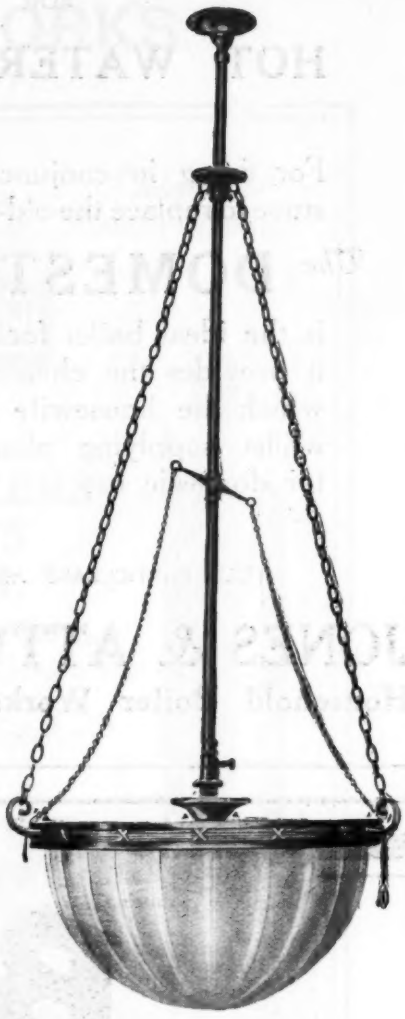

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The demand for better lighting and lighting fittings grows apace. The old-fashioned type of fitting is rapidly giving way to those constructed on modern ideas and possessing beauty plus efficiency. We illustrate our Semi-Indirect Pendant No. 4189 which is well made and perfectly finished, and representative of the wide range of this class of fitting we can supply. With one of the largest stocks of glassware in the country we are able to give you a choice from which patterns can be selected to harmonise with practically any decorative scheme.

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*with* SINGLE OVEN BURNER & DIRECT BOTTOM-FLUE-OUTLET

*with* "REGULO" Automatic *(Self-Compensating)* OVEN HEAT CONTROL

## *Only with New World Ovens do you obtain:*

1. Complete circulation of hot gases throughout the whole of the cooking space and the avoidance of hot spots.
2. Uniform cooking with the oven fully loaded.
3. Greatly increased oven capacity.
4. Reduced gas consumption.
5. Higher quality of cooking than in any other type of oven.
6. Elimination of all possibility of smothering, or accidental extinction of the burner flames from any cause whatsoever.
7. Reliable automatic oven-heat control.

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THAT WAS WELL KNOWN before any other Controller on the market was ever made to be

**The British System and the Pioneer of Automatic Street Lighting.**

**THE CONTROLLER THAT HAS NEVER BEEN EQUALLED**

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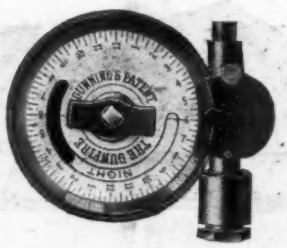
Ask for a list of sixty testimonials we issued in 1910 and put it to the test if these Engineers do not confirm their then opinion.




One of these, the well-known Consulting Engineer—

N. H. Humphrys, Esq., who gave his opinion in 1905, said:

"10th Feb., 1923.

"They have invariably proved reliable, some out for twenty years, and never needed repairs.

"I have some hundreds in use."

**The CONTROLLER that has a Record of 25 Years' Service**

And which continues to give perfect satisfaction.

*We are satisfied if you make your own inquiries of users of your own selection, instead of listening to interested parties, you will have the "GUNFIRE" and NO REGRETS.*

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"Broadbent"

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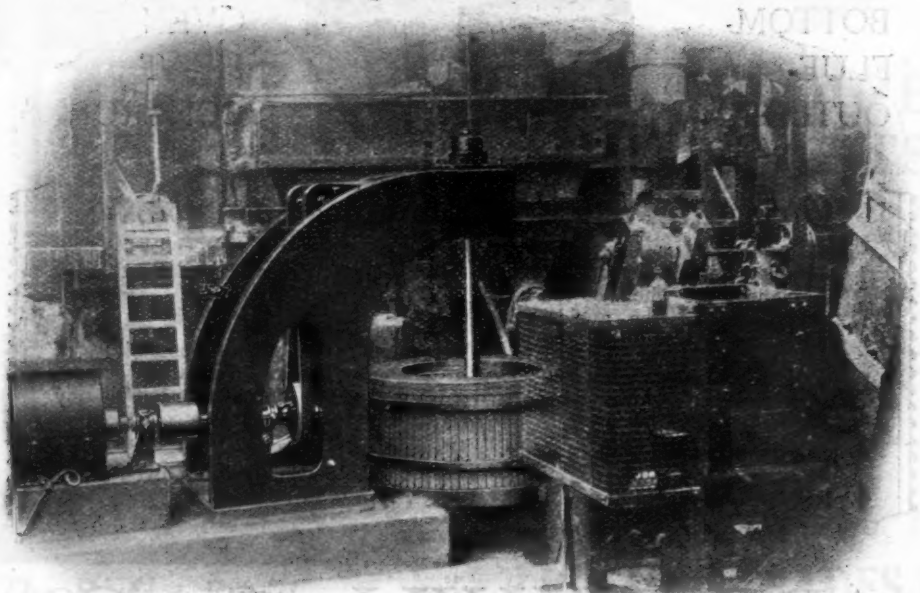

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*The World's Best Machines for Drying Sulphate of Ammonia.*

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FOR GENERAL FOUNDRY and FORGE PURPOSES.

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ANNUAL OUTPUT **4** MILLION TONS.

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FOR **WATER-GAS, Steam, Sewage, & Hydraulic Power.**

## TARRED SLAG
**Slag made by Patent Process**

**Crushing Strength: 1306 tons per sq. foot.**

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| Naphthalene Tablets | Sulphate of Copper | Green Oil. Pitch |
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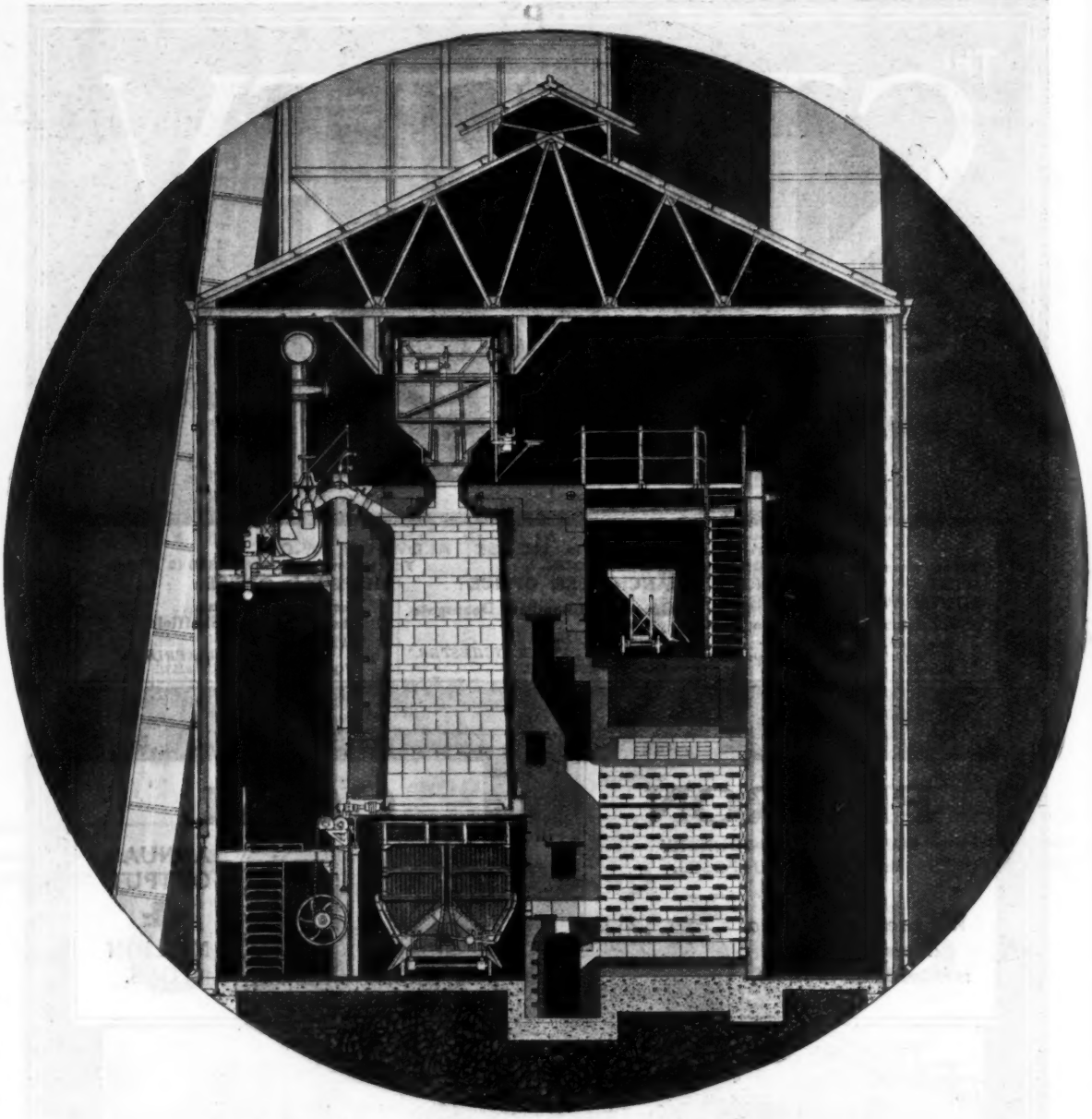
| Naphthalene Flakes | Red Oxide of Iron | Muriate of Ammonia |
| Naphthalene Powder | Bleaching Powder | Oleum (all strengths) |
| Cresylic Acid | Caustic Soda | Pure Sulphuric Acid |
| Crude Carbolic Acid | Accumulator Acid | Sulphate of Ammonia |



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for charges of 20, 30, 40, and :: 50 cwt. per 12 hours. ::

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JOSEPH TAYLOR (SATURATORS), LTD.

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For Any Description of LEADWORK.

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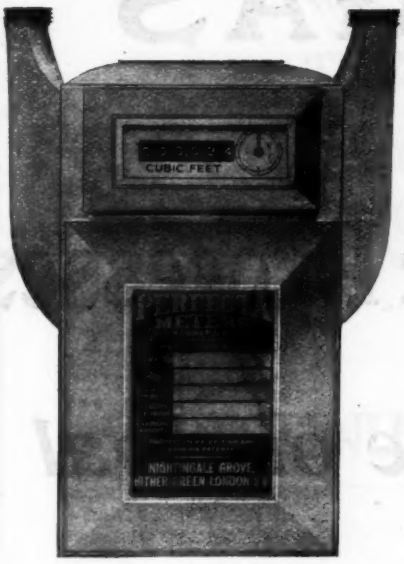


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*ORDINARY and PREPAYMENT Types*

Small Size.
Extreme Accuracy of Registration at all Loads.
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A Real Engineering Method of Valve Drive.
Made with Direct Reading Index if Preferred Instead of the Ordinary Dial Index.

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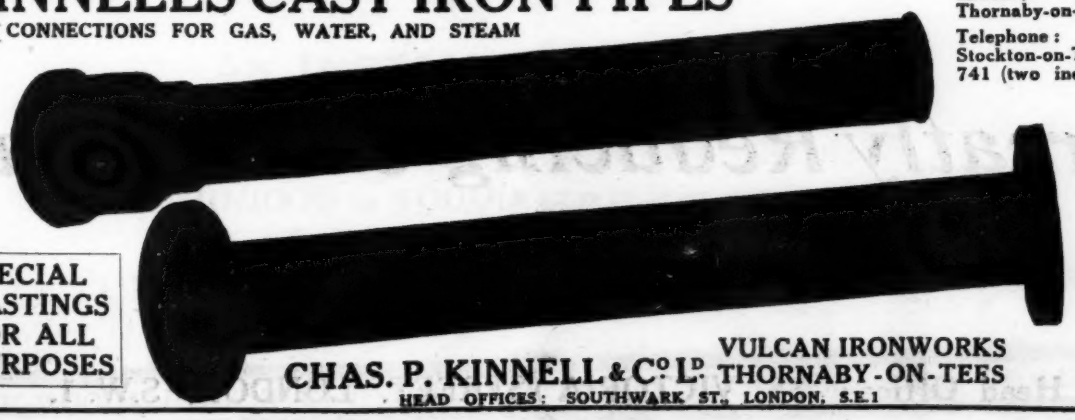

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## BLUE
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THESE RETORTS GIVE
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AN INSTALLATION of 103 inch
W-D RETORTS has a DAILY
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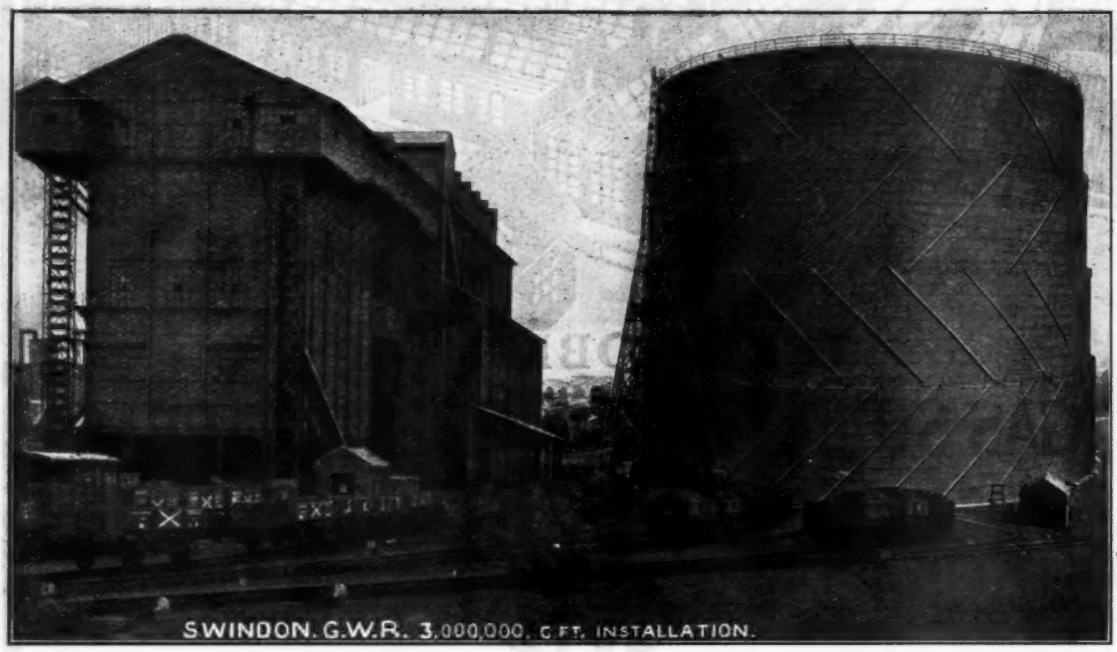
300,000 to 400,000 cu.ft. for every 4'.6"
of RETORT HOUSE LENGTH

The WOODALL-DUCKHAM VERTICAL RETORT & OVEN CONSTRUCTION CO.,(1920) LTD.

# "DEMPSTER-TOOGOOD" COMPLEAT CARBONIZATION

## *Science Improves.*



SWINDON. G.W.R. 3,000,000 C.FT. INSTALLATION.

## *Practice makes Perfect.*

| | | | |
|---|---|---|---|
| COAL | HANDLED | 100 | TONS PER HR. |
| DRY-COKE | " | 50 | " " |
| GRADED-COKE | WASHED | 20 | " " " |
| BREEZE | BRIQUETTED | 3 | " " " |
| BUNKERAGE | TOTAL | 1,000 | TONS. |
| GAS STORAGE | SPIRAL HOLDER | 2,500,000 | CU. FT. |
| SAFETY-FIRST LADDER | OVERHUNG FOR DIPS | 123'-0" | HIGH |

*ALL MANUFACTURED BY*

# ROBERT DEMPSTER & SONS, LTD.,

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The Parkinson Stove Co. Ltd

# The "HARROGATE"

HARROGATE, the famous English Spa, includes in its list of patrons the Nobility and many other distinguished members of Society who find in the virtue of its waters and the charm of its beautiful surroundings a magnetic attraction.

The "HARROGATE" Gas Fire (named after this famous Spa) is constructed on healthful hygienic principles which ensure perfect ventilation, and its distinctive design adds a special charm to the most decorative surroundings.

*Ask for Art Booklet, illustrating other equally distinctive Parkinson Gas Fires.*

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# the "Regulo" (Regd.)

¶ The perfect simplicity of the "Regulo" in the "New World" Cooker and its unfailing reliability under all conditions of pressure or supply, open up enormous possibilities in the direction of extending the use of Gas for cooking. The proved dependability of the "Regulo," together with the other advantages of the single burner with direct bottom-flue-outlet (introduced by Radiation Limited), has given the Industry its most potent means of meeting successfully the competition from other fuels. No other cooker has the same popular appeal as the "New World."

Radiation
LIMITED

### *Outstanding features of the Radiation "New World" Cooker Ovens are—*

**1.**—Direct bottom-flue-outlet, which in conjunction with the single-burner ensures even heating with a maximum efficiency. Reduced air enters the oven and the atmosphere is steam-rich and ideal for cooking.

**2.**—Single oven burner, which is proved superior to two burners and gives more cooking space in the oven.

**3.**—Oven shelves carried on embossed projections on the enamelled linings. Ample number of these for all requirements, and "gates" are obviated.

**4.**—Enamelled base-plate that keeps out dust and enables the low-temperature zone at the bottom of the oven to be used for milk puddings, &c., and for stewing when "Regulo" is used.

**5.**—The "Regulo" oven-heat controller, that compensates satisfactorily for all variations of pressure or quality that may occur in any part of the country, and needs no adjustment after leaving our Works.

The principle of standardization and interchangeability of working parts has always been a first consideration in the production of each series of Radiation appliances. Thus, rapid progress in design and efficiency, has, at the same time, meant that all the firms associated with Radiation manufacture and supply Radiation Standard Cookers and Gas Grates, which are interchangeable one with the other in all working and essential parts.

*Manufactured in individual exterior designs by*

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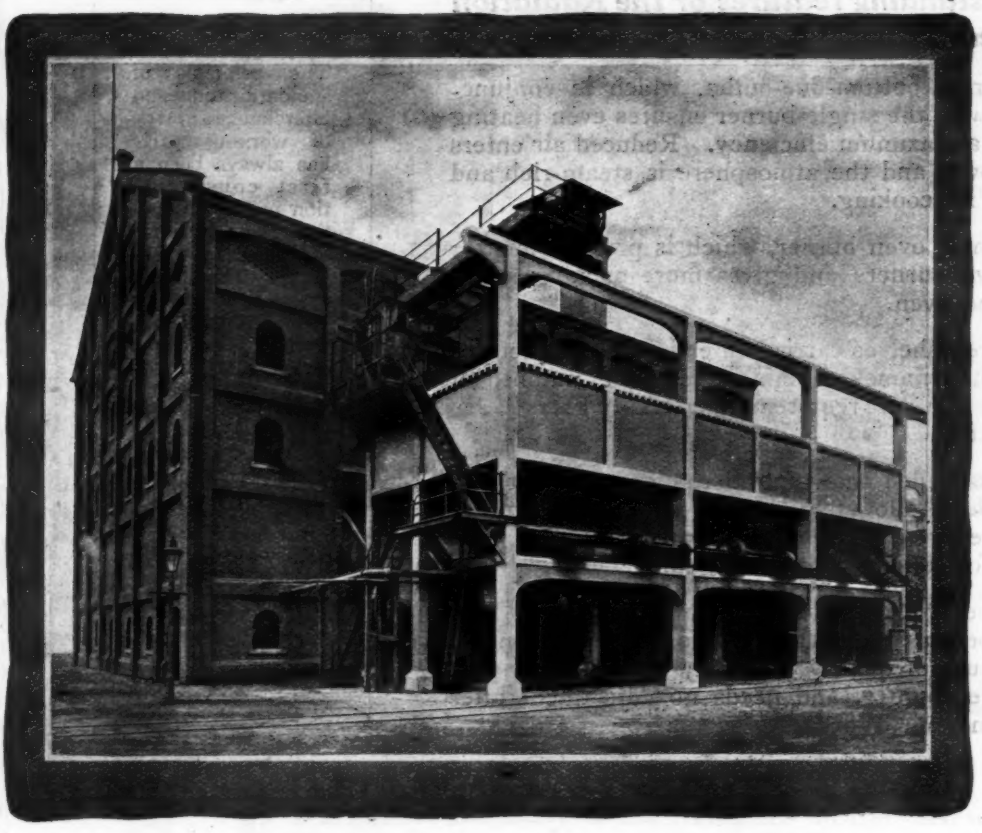
**Radiation**
LIMITED
PROPRIETORS

Service and Thoroughness

# SOME OF OUR CONTRACTS



THIS battery of Reinforced Concrete Coke Storage Hoppers is adjacent to the Quenching Benches from which the coke is handled by the Overhead Transporter shown. Immediately beneath the Hoppers is a set of "Cascade" Screens.

This contract comprised a Steel Framed Retort House, brick filled and containing six beds of 8 Retorts 24 ins. by 18 ins. by 23 ft. long, with Wagon Tipper, Coal Breaking, Elevating and Storage Plant, Stoking Machine, Hot Coke Transporter, Quenching Benches, and the foregoing Hoppers and Screens.

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# The CINDERELLA

## INSET GAS FIRE

Apart from its sound construction, efficiency, and economy in gas consumption, the popularity of the CINDERELLA is due to the handsome appearance of the fire itself, its perfect semblance in action to a glowing coke fire, and the manner in which it harmonises with its surroundings. It is a simple matter to fit a CINDERELLA to any existing interior.

**The Patent CINDERELLA Hanging Mat**

The black cokette top fuel is supplied in the form of a hanging mat, and to keep this in position it is secured to the back of the fire by two screws. To these screws also is attached the sheet-iron plate provided to fill up the space between the back of the fire and the bricks of the interior. Loose fuel is used to cover up the plate.

*Make the CINDERELLA one of your "Main" Lines*

MAIN

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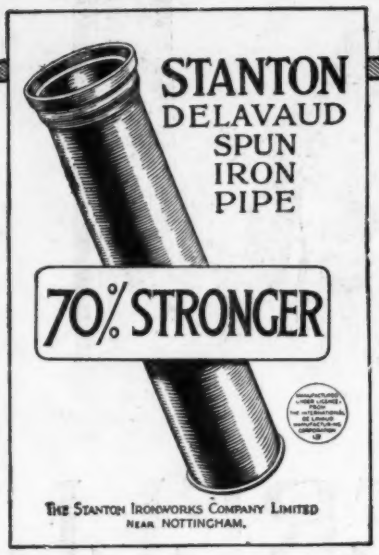



UP TO OCT. 31ST 1927

TOTAL ORDERS RECEIVED EQUAL

2770 MILES

FROM 779 CUSTOMERS

OF THE ABOVE

REPEAT ORDERS

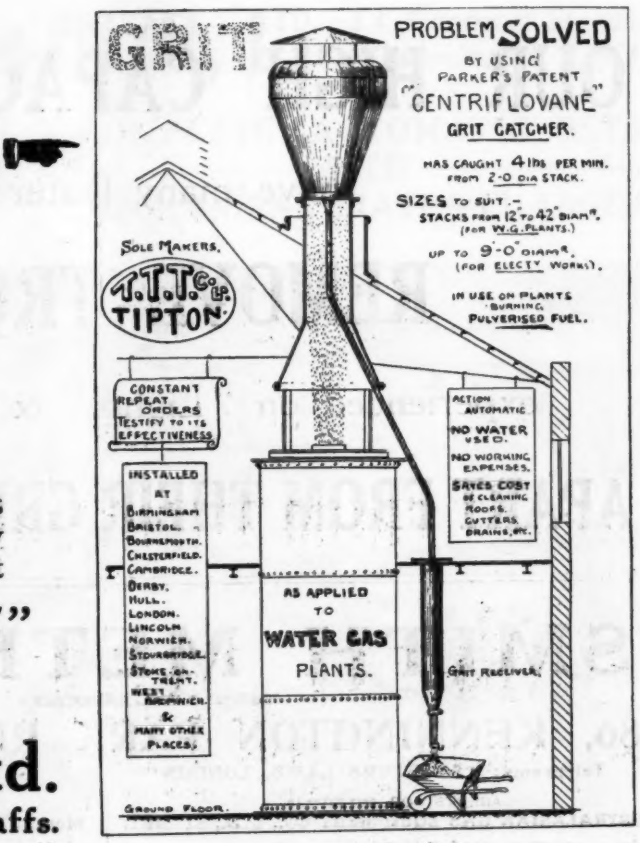
EQUAL

2161 MILES

THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM.

Telephone: ILKESTON 86. Telegrams: "STANTON, ALFRETON."

# GRIT CATCHERS




*See descriptive reference on p. 874 of this issue.*

Numbers of other Catchers have been successfully displaced by the Patent

***"CENTRIFLOVANE"***

## T.T.T. CO., Ltd.

**84, Dudley Road, Tipton, Staffs.**

## Dealing with rush Peak loads

These are the days, when fog descending suddenly causes a sharp peak load, that the superiority of "Peebles" System of Remote Control for District Governors to hand-weight loading proves so apparent.

With "Peebles" Remote Control, the pressure on any district main can be altered instantly to suit the load.

If you have not adopted it, ask us for full particulars.

# Peebles

## REMOTE CONTROL

*PEEBLES & CO., LTD., Tay Works, Bonnington, EDINBURGH*

E.I.H.

## E. FOSTER & CO.

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# OUR HIGH CAPACITY METERS

have many features which

# REMOVE TROUBLES

experienced on "Lights" & "Standard" types

# APART FROM THEIR GREATER CAPACITY

## SMITH METERS LTD.

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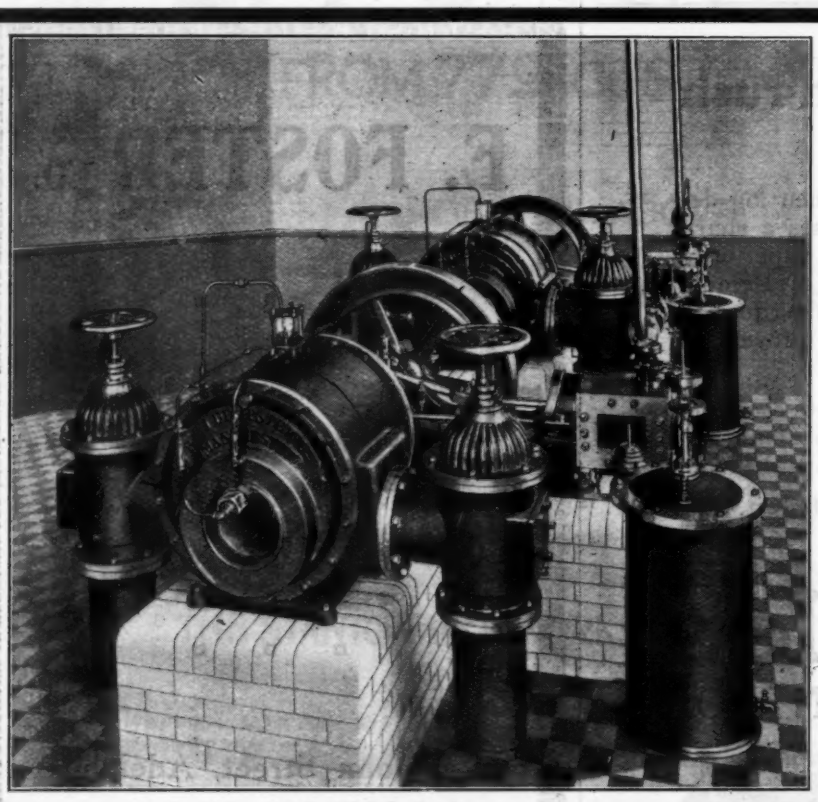

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Manufacturers for

## THIRTY YEARS

Having rebuilt and extended our

## FITTING SHOP

we have additional facilities for this class of work.

*Write for our new Exhauster Catalogue.*

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LOW PRESSURE HAND-HYDRAULIC CONTROL for WATER - GAS PLANTS

COMPLETE AUTOMATIC SETS WITH MECHANICAL GRATE & CHARGER

**M**ake greatly improved

**O**peration quick & easy

**R**educed labour

**E**fficiency increased

**G**reater accuracy

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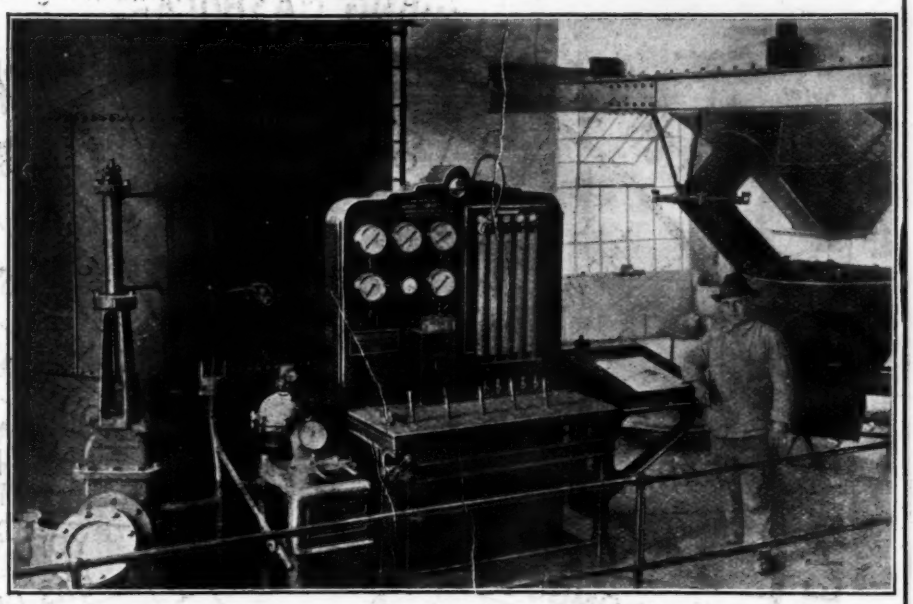

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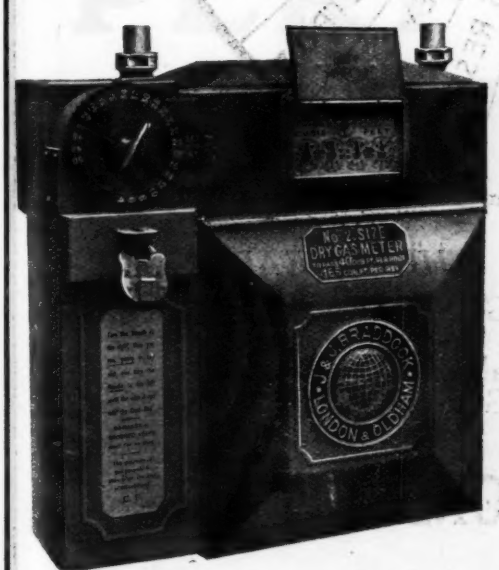


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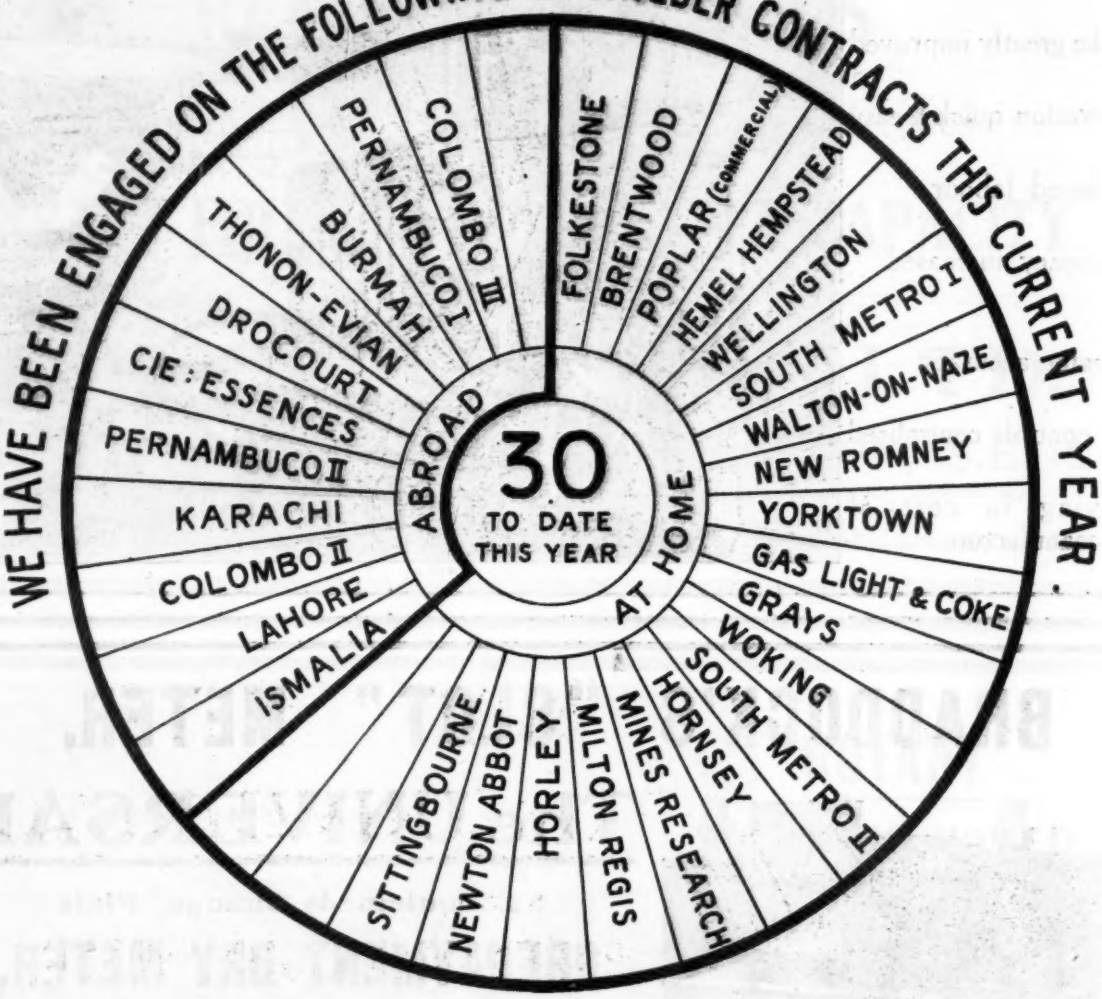


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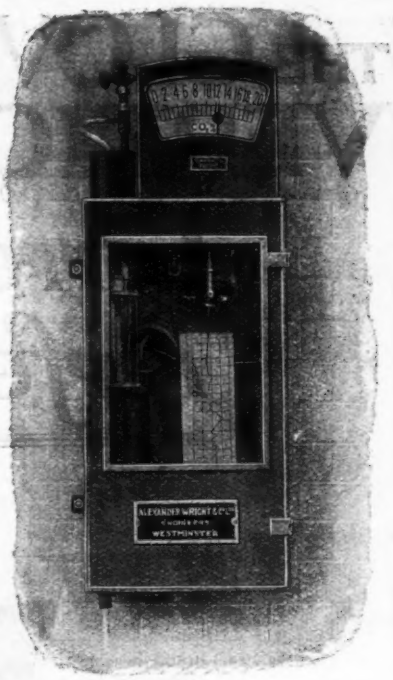

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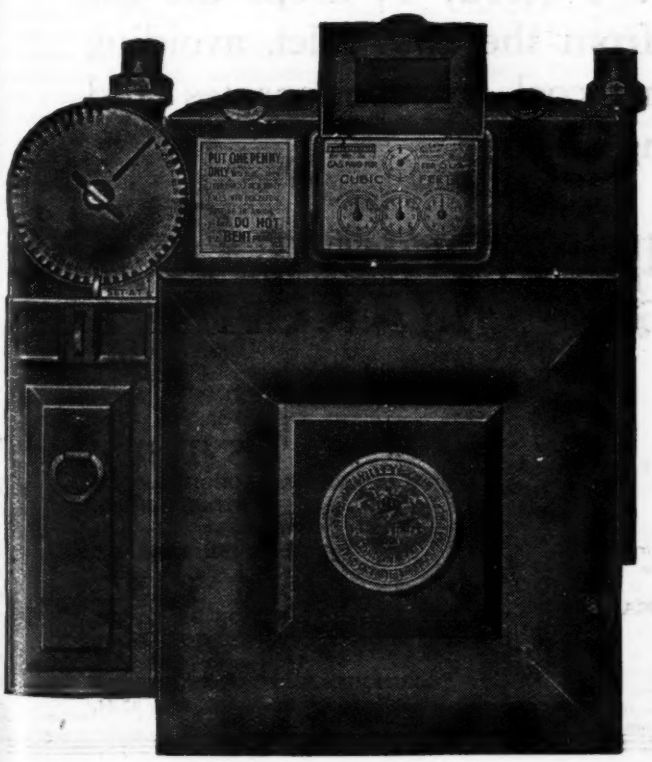


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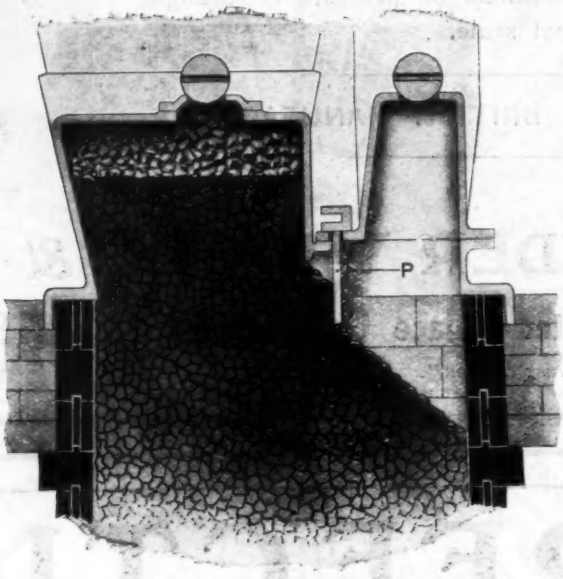


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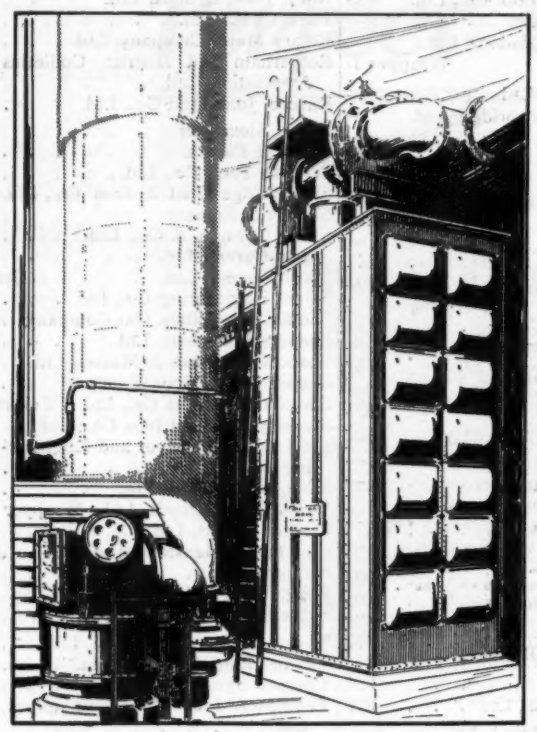

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Applicants must be thoroughly competent men, having good knowledge of Laying Mains and the up-to-date Distribution and Manufacture of Gas, Sulphate of Ammonia, and other Residuals.

Salary £260 per Annum, with House, Light, and Firing.

Applications, stating Age, present or past employment, and giving full particulars of Qualifications, with *copies* of two recent Testimonials, and endorsed "Gas Manager," must reach me not later than Monday, the 2nd of January, 1928.

A. H. FILMER,
Clerk to the Council.

Town Hall,
Milton Regis,
Dec. 19, 1927.

## APPOINTMENTS, &c., WANTED.

**GAS Cookery Demonstrator, fully** qualified (Diplomée National Training School of Cookery), Demonstrator at Wembley and Ideal Home Exhibitions, and also for "B.C.G.A.," is free to accept Daily or Weekly Engagements.
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The Contractor or Contractors may be required to enter into a Contract with approved Sureties for the due performance of the Contract.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
GEO. LIVSEY,
Town Clerk.

Town Hall,
Wallasey,
Dec. 19, 1927.

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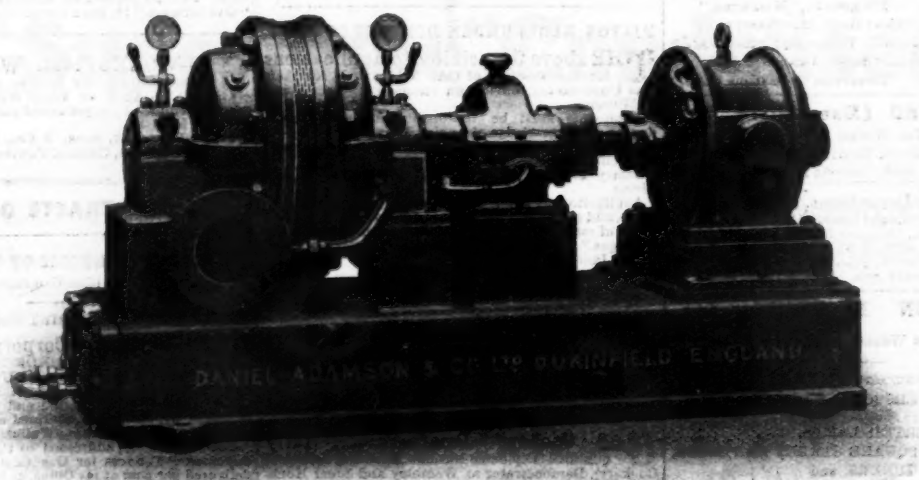

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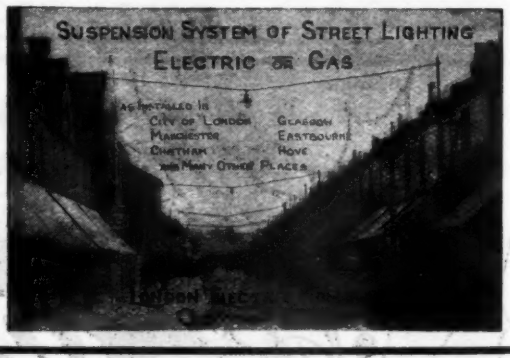


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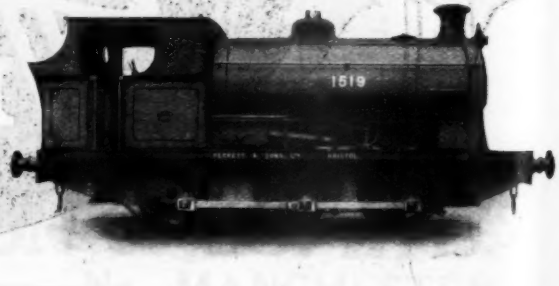

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FIG. 3

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FIG. 4

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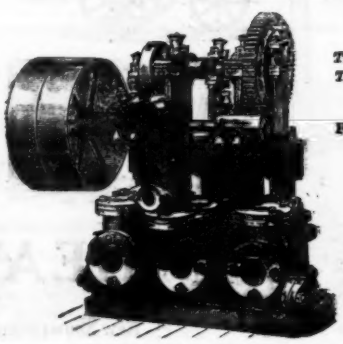

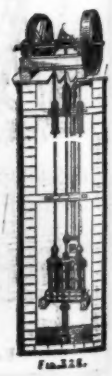

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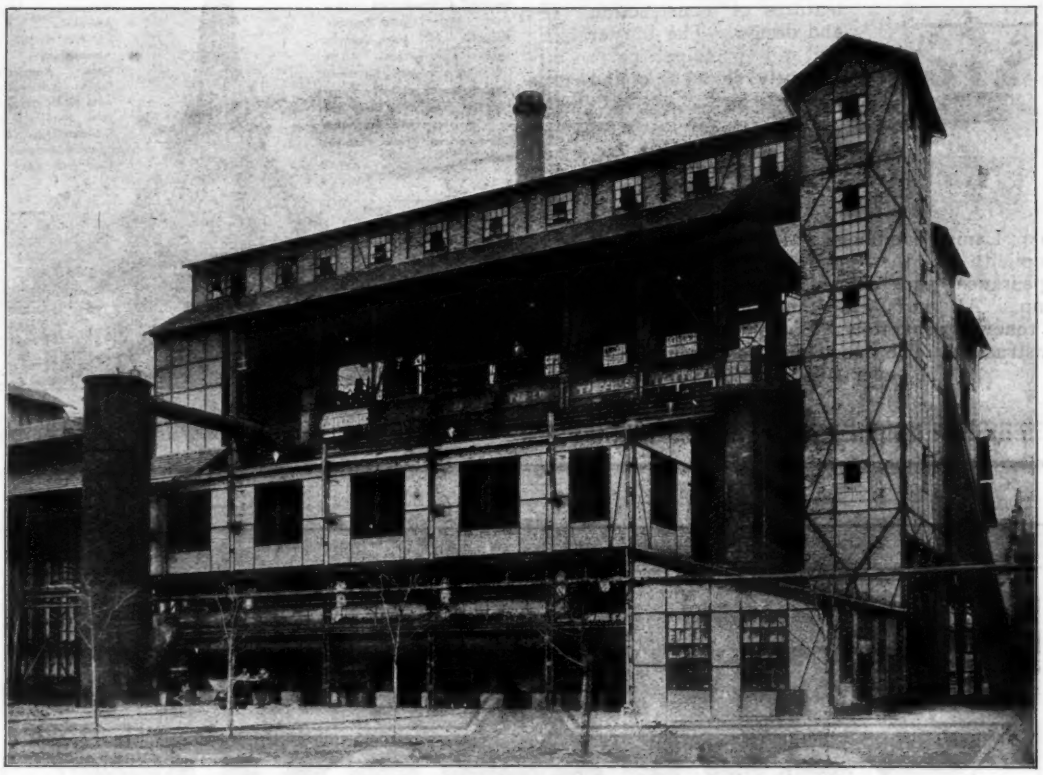

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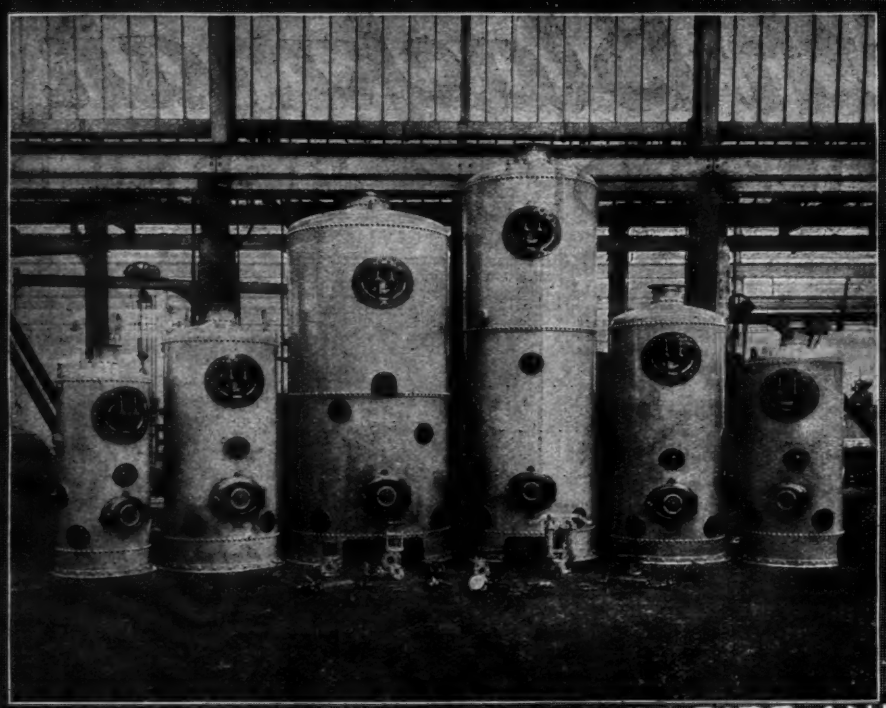

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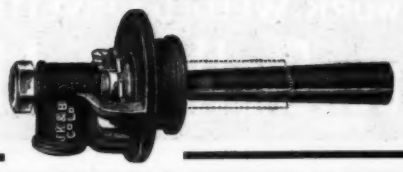

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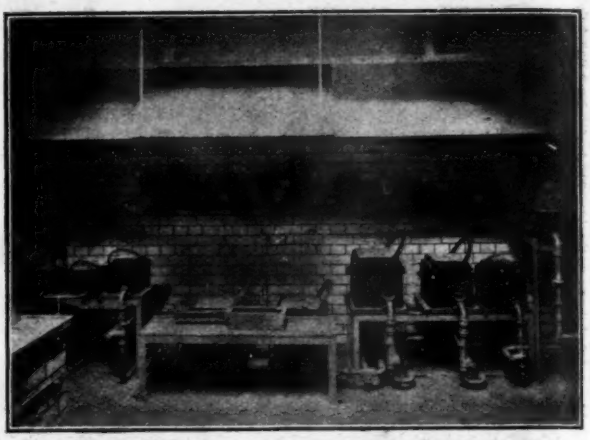

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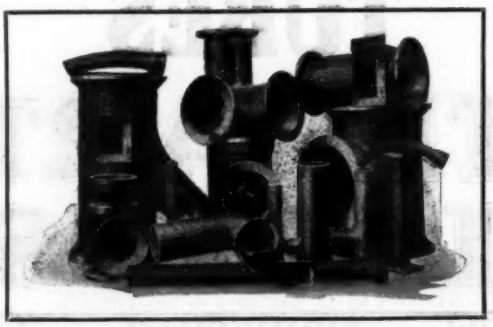

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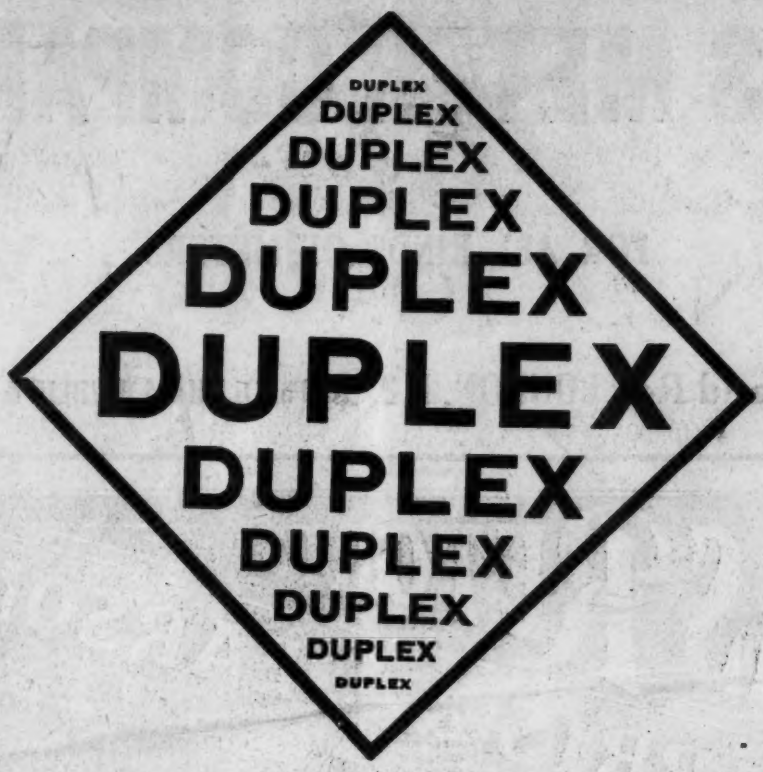


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